Factors that Influence the Utilisation of Ototoxicity Monitoring Services for Patients on Treatment for Drug-Resistant Tuberculosis

By

Student Name: Primrose Tinashe Nhokwara

Student Number: NHKPRI001

SUBMITTED TO THE UNIVERSITY OF CAPE TOWN

In partial fulfilment of the requirements for the degree

M.Sc. in Audiology

Faculty of Health Sciences

University of Cape Town

Date of submission: 13 May 2015

Supervisor: Christine Rogers

Co-Supervisor: Dr Lebogang Ramma

Department of Health and Rehabilitation Sciences: Division of Communication Sciences and Disorders

Plagiarism Declaration

- I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
- I have used the American Psychological Association (APA) formatting for citation and referencing. Each significant contribution to, and quotation in, this proposal from the work or works, of other people has been attributed, cited and referenced.
- This dissertation is my own work.
- I have not allowed, and will not allow anyone to copy my work with the intention of passing it off as their own.

Name: Primrose Nhokwara **Student number:** NHKPRI001

Signature: Signed by candidate

Date: 13 May 2015

Abstract

Multi-drug resistance is increasingly becoming a challenge to tuberculosis control programmes globally. Treatment of multi-drug resistance tuberculosis (MDR-TB) includes aminoglycoside antibiotics which are known to cause hearing loss. Ototoxicity monitoring services are often provided to patients undergoing treatment for MDR-TB for early detection of ototoxic hearing loss to facilitate alerting the patients and relevant medical staff about the presence and progression of any hearing loss. Previously, models of managing patients with MDR-TB required mandatory hospitalization for at least 6 months. This made it relatively easy to monitor the hearing status of patients during their stay in the hospital. However, with recent introduction of policy guidelines that support management of patients with MDR-TB on an outpatients basis, ototoxicity monitoring for these patients will need to be reorganized to align with the new policy guidelines. The extent of the uptake of these services when patients are accessing them as outpatients is however, unknown. This study therefore aimed to describe the patterns of utilisation and explore the barriers and factors that facilitate the use of ototoxicity monitoring services when provided on an outpatient basis in the Cape Town Metropolitan area, Western Cape, South Africa.

Methodology: This was a descriptive quantitative study that proceeded in two phases: Phase one used a retrospective record review to describe the pattern of use of the audiological services when provided on an outpatient basis. A total of 801 medical records of patients who were accessing MDR-TB care at a central TB hospital were reviewed. Phase two explored factors that were facilitators of and barriers to the use of ototoxicity monitoring services. An exploratory survey methodology was used and the target population was adults with MDR-TB who were accessing treatment on an outpatient basis. Participants were sampled via a convenience sampling strategy. Patients attending MDR-TB treatment services at various health facilities were surveyed using a pretested and validated questionnaire developed for the purposes of the study. A total of 74 participants were surveyed and the analysis of the questionnaire was conducted using descriptive statistics (frequency counts). Both descriptive and inferential statistical tests were used to analyse data collected in this study.

Results: A review of medical records in phase one of this study revealed that out of the first six standard hearing test appointments for patients being monitored for ototoxicity evaluated, a total of 76% patients attended between 1-3 visits, (with 39.1% attending only the first appointment). Patients with normal hearing status as well as those who needed to travel greater distance to access services were more likely to not attend their scheduled appointment for ototoxicity monitoring. In contrast, patients with pre-existing hearing loss, patients who developed hearing loss during treatment as well as the presence and development of disabling hearing loss were more likely to attend their scheduled appointment for ototoxicity monitoring. Phase two results showed that: close proximity to the healthcare facility, good interaction with nurses and having awareness of the ototoxic effects of the medication and therefore the need to monitor the hearing were positively associated with utilisation. Barriers identified were; having appointment clashes for co-existing ailments or grant processing, being hospitalized or the patient being sick (related to TB), and perceptions that normal hearing obviated the need for audiological monitoring services.

Conclusion: Ototoxicity monitoring services that are provided on an outpatient basis seem to be largely under-utilised among participants in this study as seen with the majority of the participants having minimal attendance (i.e. between 1-3 visits). Facilitators for utilisation of services were as follows: close proximity to the health facility, good interaction with the TB nurses and understanding the importance of monitoring the hearing due to the ototoxic effects of TB medication. Barriers reported by the participants included appointment clash for co-existing ailments or for grant processing and/ mixing up of dates, being hospitalized or the patient was sick and personal attitude- thinks the hearing is fine so does not need to have the hearing tested. Barriers to attendance need to be further analysed and addressed in order for the patients to maximise the utilisation of the services.

Key words: adherence, exploratory survey, MDR-TB, ototoxicity monitoring, service utilisation, tuberculosis

Acknowledgements

I would like to thank the Lord for giving me the grace to do this work and complete it.

To my supervisor Christine Rogers and co-supervisor, Dr Lebogang Ramma, thank you for the support and guidance that I needed throughout, from the moment I started right to the end, as well as the CSD department for their input.

To the staff members at the facilities where I conducted my data collection, thank you for the help and willingness to accommodate me and ensuring that I got the information that I needed.

To my statisticians, Mr Dominique Katshunga and Mr Henri Carrara, thank you for helping me analyse the data and always encouraging me.

To my friends, thank you for giving me the strength to continue and for proof reading my work.

Heartfelt thanks goes to my family for making it possible for me to study and the encouragement to finish and pursue my dreams as well as my Gospel Ramah Church family for their never-ending love and support.

Table of Contents

List of Appendices

List of Figures

List of Tables

Chapter One: Introduction

Introduction: This chapter will contextualise the study by describing the global burden of tuberculosis (TB). The emergence of multi-drug resistant TB (MDR-TB) and its threat to TB control will be presented. Finally, the link between the treatment of MDR-TB and hearing loss and the need for monitoring will be outlined.

Global Burden of TB

Despite advances in technological measures that yielded better diagnostic tools and drug regimens for tuberculosis (TB) management, TB remains one of the major public health challenges of the 21st century (World Health Organization [WHO], 2013). Global estimates of TB cases were reported to have a prevalence of 12 000 and an incidence of 8 600 cases per 100 000 per year (WHO, 2013). As far back as 1991, WHO expressed great concern regarding the threat that TB posed in the public health sector.

The majority of reported TB cases are in South-East Asia (29%) (with India and China, accounting for 26% and 12% of these cases respectively), followed by Africa (27%) and West Pacific regions (19%) (WHO, 2013). In WHO's opinion, a major concern regarding the African region is that it is not on track to reach the target of reducing the incidence and prevalence of TB; and deaths by one half between 1990 and 2015 (WHO, 2013). In addition, Africa's rank of second in regions with high incidence TB cases suggests that significant effort is required to curb this pandemic.

In 2013, out of the 22 high-burden TB countries worldwide, nine were in the Africa (WHO, 2013). Furthermore, the African region is reported to have the highest proportion of individuals who are co-infected with TB and the human immunodeficiency virus (HIV) and more than 50% of these cases were in parts of Southern Africa (WHO, 2013). Together, the continuing poverty and political instability in parts of the continent have inhibited progress in implementing effective TB control measures (Dye et al., 2006).

South Africa is considered to be one of the high burden TB countries and is currently ranked third among the 22 high-burden TB countries worldwide (WHO, 2013). The burden of TB in South Africa is estimated to be 400 000 – 600 000 with around 1000 or more cases per 100 000 people in South Africa (WHO, 2013). This is considered to be a high prevalence rate especially when compared to about 10 per 100 000 population in parts of North America and Western Europe (WHO, 2013). The high occurrence of this disease in South Africa comes with a negative economic impact. First, due to the magnitude of the problem, the inherent costs of treatment is high in terms of public health spending (TB Alliance, 2015), which will be discussed in more detail. Second, the majority of the disease incidence and resultant deaths occur amongst the most economically active segment of the population (Murray 1996 as cited in WHO, 2000). These individuals are in most cases, the bread winner of the family therefore the loss of income has a direct impact at a family and societal level (WHO, 2000).

With TB at pandemic proportions, WHO recommendations regarding the treatment of all TB cases were adopted in South Africa in 1997 (Churchyard et al., 2014; Médecins Sans Frontières [MSF], 2011). The treatment entails using a form of a Direct Observed Treatment Short (DOTS) course which has five distinctive elements namely political commitment with increased and sustained financing; case detection through quality-assured bacteriology; standardized treatment, with supervision and patient support; an effective drug supply and management system and last, monitoring and evaluation system, and impact measurement. Direct observation of treatment under the supervision of a healthcare worker is primarily associated with DOTS (WHO, 2010). Two primary aims of DOTS are to ensure completion of treatment and a cure for patients with TB; and second, to prevent drug resistance from developing in the community (Davies, 2003; Duggal & Sarkar, 2007; WHO, 2010).

MDR-TB

The primary cause of MDR-TB is due to inappropriate treatment (MSF, 2011). WHO (2013) stated that inappropriate or incorrect use of anti-TB drugs, or use of poor quality medicines, can all cause drug resistance. Most of the medication has undesirable side effects to the patients such as unexplained fever, feeling weak as well as blurred vision (MSF, 2011). Treatment for drug-resistant TB is longer and associated with more significant side-effects than drug susceptible TB (Njuguna, 2013) which may lead to some patients discontinuing treatment (MSF, 2011).

MDR-TB is described as a form of TB caused by bacteria that does not respond to, at least, isoniazid and rifampicin, the two most powerful, first-line anti-TB drugs (WHO, 2013). With more than 450 000 new cases reported worldwide in 2012, MDR-TB is likely to put a strain on TB control programmes globally (Gandhi et al., 2010; WHO, 2013). In 2012, an estimated 450 000 people developed MDR-TB globally. An increase of 42% of MDR-TB cases was also seen between 2011 and 2012 and the largest increase was in India, South Africa and Ukraine (WHO, 2013). It is estimated that about 9% of MDR-TB cases had extreme-drug resistant TB (XDR-TB) (WHO, 2013). Prevalence of MDR-TB was estimated to be 3.6% (95% CI 2.1%-5.1%) amongst new TB cases and up to 20.2% (95% CI 13.3%-27.2%) in previously treated MDR-TB cases in the same year (WHO, 2013).

The number of MDR-TB patients is on the rise in South Africa (WHO, 2013). In 2008/2009 a survey was conducted by MSF, the City of Cape Town and National Health Laboratory Services (NHLS) in two sites. In Khayelitsha, an informal settlement area in Cape Town, 5.2% of new TB cases and 11.1% of previously treated TB cases were due to rifampicin-resistant strains (Cox et al., 2010). In 2012 an escalation was noted with about 15,400 MDR-TB cases that were diagnosed in South Africa; 1.8% of new TB cases and 6.7% of recurrent cases have MDR-TB (WHO, 2013). Hence, an estimated increase of MDR-TB cases is expected to continue.

The concern regarding an increase of patients who are diagnosed with MDR-TB is because MDR-TB treatment involves the use of a drug regimen (second-line drugs) that contains aminoglycoside antibiotics. These are known to be ototoxic in nature and can

lead to hearing loss as one of the side effects (Selimoglu, 2007). Aminoglycosides are commonly prescribed antibiotics used for treatment of life threatening illness such as gram negative infections and MDR-TB (MSF, 2011). This group of drugs is known to have the potential to cause toxic damage to both the kidney and the inner ear (Huth, Ricci & Cheng, 2011). According to Huth et al. (2011), renal toxicity is potentially reversible but the effects are permanent in the ear. Kanamycin and amikacin are mainly cochleotoxic whereas streptomycin and gentamicin are predominantly vestibulotoxic (Huth, et al., 2011). In South Africa, kanamycin is one of the drugs that forms part of second-line TB regimen (Department of Health, 2011) despite recommendations that the drug should be made obsolete due to its toxicity (Garcia-Prats, Donald, Hesseling & Schaaf, 2013).

Popularity of aminoglycoside use in the developing world is due to its low cost and powerful antibacterial activities, outrivaling more expensive antibiotics with less severe side effects (Huth et al., 2011). As a result, the incidence of aminoglycoside ototoxicity in developing countries is likely to be higher in comparison to the industrialized world. Furthermore, in the developing world monitoring for serum levels or for toxicity is less likely (Huth et al., 2011). In South Africa, MDR-TB prevalence is high in HIV positive population (Padarath & Fonn, 2010; World Health Assembly, 1991) and highly active antiretroviral therapy (HAART) and ototoxic MDR-TB drugs are given simultaneously which compounds the potential for ototoxicity (Harris, Peer & Fagan, 2012; Jacobs & Ross, 2012). HAART drugs are thought to be ototoxic and moreover, individuals with HIV are at a greater risk of contracting opportunistic central nervous system infections (Harris, Peer, et al., 2012; Khoza-Shangase, 2010). Jacobs and Ross (2012) conducted a study in Durban, South Africa on the adverse effects of MDR-TB treatment on patients. Adverse events were significantly more common in patients who were HIV positive than in patients who were HIV negative with regard to peripheral neuropathy, psychosis and confusion, hearing loss and thyroid disease.

Physiology and Pathophysiology of Aminoglycosides Ototoxicity

An ototoxic effect within the class of aminoglycoside drugs was first documented with streptomycin which was introduced in 1940 to treat tuberculosis (Hinshaw & Feldman, 1945). After systemic administration, aminoglycosides are detected in the cochlea within minutes (Huth et al., 2011). Based on the cochlear structures, entry of aminoglycosides into the inner ear suggests a complex uptake mechanism. Both endocytosis and transport through ion channels are proposed to mediate aminoglycosides uptake into sensory hair cells (Huth et al., 2011). Hashino and Shero (1995) observed kanamycin in intracellular vesicles 27 hours after systemic injection in chicken (Hashino & Shero, 1995 as cited in Huth et al., 2011). These findings were interpreted as evidence for endocytosis as mechanism of aminoglycoside uptake as the vesicle membranes contained cationic ferritin, a membrane bound marker (Hashino & Shero, 1995).

In their study, Qing and Mao-Ling (2009) found that kanamycin induced a major loss of outer hair cells but not of inner hair cells. Thus all studies to date suggest that first the outer hair cells is preferentially and irreversibly destroyed by aminoglycosides and second after prolonged treatment the inner hair cells and finally the spiral ganglion neurons are damaged. In addition, the ototoxicity of a number of aminoglycosides on outer hair cells in cochlear cultures using scanning and transmission electron microscopy (SEM and TEM) was investigated and found that ototoxicity order was: neomycin>gentamicin>dihydrostreptomycin>amikacin (Qing & Mao-Ling, 2009). The molecular mechanism of aminoglycoside ototoxicity on the outer hair cells has been proposed by Williams et al (as cited in Qing and Mao-Ling, 2009) to be: 1) reversible binding of the aminoglycoside in competition with calcium to the plasm membrane, 2) energy-dependent uptake of the drug (similar to polyamine transport). However, recent studies by Basile et al (as cited in Qing and Mao-Ling, 2009) demonstrate that aminoglycoside induced ototoxicity is mediated by the polyamine site of the NMDA receptor.

Similar to cisplatin ototoxicity, various inner ear cell-types are thus affected by aminoglycoside treatment with the cochlear and vestibular hair cells and neurons being the most vulnerable to cellular degeneration. The degeneration tends to begin at the basal coil and extend apically thereby affecting the higher frequencies first (Tsuji et al, 2000). These drugs tend to cause permanent, irreversible damage which profoundly impacts the patient. In order to detect the hearing loss early, one way to manage it is to monitor the hearing regularly (i.e. ototoxicity monitoring).

Ototoxicity and Quality of Life

While not focussed on the aetiology of hearing loss, Dalton et al., (2003) explored its severity on the quality of life in a large population-based longitudinal study. Communication difficulties and health-related quality of life were assessed. Their findings showed that the severity of hearing loss was significantly associated with having a hearing handicap and with self-reported communication difficulties, therefore reducing the quality of life in older adults (Dalton et al., 2003). These findings suggest that the worse the hearing loss is, the greater the impact on the quality of life, and most aminoglycoside-linked hearing loss tend to yield a severe or profound hearing loss (Harris, Peer, et al., 2012). Patients can therefore be prepared for the possible progression of the hearing loss, receive counselling and rehabilitation in order to try to ameliorate the expected poor quality of life and issues related to hearing loss.

Tuberculosis (TB) patients have not only medical but also social problems related to their illness, which may influence their motivation for the completion of treatment (Karyadi et al., 2002). Their study investigated the social aspects of patients with TB in an urban area of Jakarta, Indonesia. The findings showed that most TB patients had poor nutritional status and lived in crowded environments. They faced joblessness and negative attitudes from their neighbours and relatives. A few of the patients were afraid that they would not find a partner; others said that their diseases impaired their marriages. In general, patients were supported by their families, both financially and socially. The findings therefore suggested that priority should be given to developing programs aimed at strengthening the family support of TB patients (Karyadi et al., 2002).

In light of the impact on the quality of life due to ototoxicity, monitoring services are therefore specified as necessary in the American Speech-Language and Hearing Association [ASHA] (1994) guidelines for patients who are on TB treatment that includes a regimen containing aminoglycosides. In South Africa, it would appear that more emphasis has been placed on treating MDR-TB than on monitoring hearing. For example, North West province has 100% DOTS coverage (Tumbo & Ogunbanjo, 2011); and yet there is still a heavy concentration of ototoxicity monitoring services at tertiary, urban hospitals and few or no services available in smaller facilities (Department of Health, 2002; Harris, Peer, et al., 2012). The increase in the number of patients with MDR-TB in South Africa would also suggest that the greater the demand will be for ototoxicity monitoring services as a public health priority. The literature review which follows will therefore further explore the role of audiological services within an MDR-TB programme in detail.

Chapter Two: Literature Review

Introduction: This chapter will start with a critical review of the literature related to studies investigating utilisation of services aimed at monitoring treatment side effects (including ototoxicity). The role of audiological services within MDR-TB programmes as well as an overview of what the ototoxicity monitoring programme within an MDR-TB programme entails will also be described. The importance of adherence to an ototoxicity monitoring programme will be highlighted. The chapter will conclude with a discussion on facilitators and barriers to utilisation of services aimed at monitoring treatment side effects using the WHO five dimensions framework.

Prevalence of Ototoxic Hearing Loss

Ototoxicity is defined as 'the permanent auditory threshold shift as a result of irrevocable loss of outer hair cells and to some degree, inner hair cells as well' in the cochlea due to exposure to drugs or chemical agents (Schacht, 2004, p. 94). Mudd, Edmund, Glatz, Campbell and Rybak (2012) stated that approximately 10% of people taking aminoglycoside antibiotics experience ototoxicity, although up to 33% have been reported in adult patients (Schacht, 1998 as cited in Khoza-Shangase et al., 2009). Ototoxicity following aminoglycoside treatment for MDR-TB, is a significant problem and has been reported to be an adverse reaction that occurs in 6-18% of patients (Duggal & Sarkar, 2007; Khoza-Shangase, Mupawose & Mlangeni, 2009). South African researchers have not only suggested a considerably higher occurrence of ototoxic hearing loss, but indicated that co-morbidity with HIV increases the risk (Harris, Bardien, et al., 2012). A study by Harris, Bardien, et al. (2012) showed that MDR-TB patients who are HIV positive are at much higher risk of hearing loss than those who are HIV negative. A prospective cohort study was conducted of 151 MDR-TB patients with normal hearing and middle ear status at baseline at Brooklyn Chest Hospital in Cape Town. Their results showed that 87 (58%) of all participants developed high-frequency hearing loss. Out of the 86 (57%) HIV-positive patients, (60/86; 70%) were more likely to develop hearing loss their HIV-negative counterparts (27/65; 42%) (Harris, Bardien, et al., 2012). The South African data regarding the prevalence could be higher because of the different pure tone averages (PTA) that can be used to determine ototoxic hearing loss. A standard three

frequency PTA versus high frequency PTA, for example, can be used. The high occurrence of hearing loss noted in the South African results therefore motivates for comprehensive services in terms of screening, diagnosis and management of hearing loss.

Impact of Ototoxic Hearing Loss

Regardless of the aetiology of acquired hearing loss, the impact can be profound and affect all areas of life (Khoza-Shangase et al., 2009). For example, in a large scale study of hearing impaired adults, Tambs (2004) showed that there was a moderate but clear effect of hearing impairment on measures of anxiety, depression, self-esteem and well-being, and that this was more pronounced in the young and middle-aged population. Brust et al. (2013) focused on patients receiving MDR-TB treatment who developed hearing loss. They found that moderate and severe irreversible hearing loss was a devastating side effect of aminoglycoside therapy. Njuguna (2013) also conducted a retrospective study on MDR-TB patients in Cape Town, and concluded that hearing loss at baseline and during treatment occurred frequently 47 (35.9%) and was often severe. The impact of ototoxicity on quality of life often leads to an inability to hear conversations, or vestibular symptoms, which may cause individuals to cease participating in their usual activities thereby impairing well-being (Weiss, 2013).

Disabling hearing impairment, which can also be a result of ototoxicity, has a profound impact on interpersonal communication, psychosocial well-being, quality of life and economic independence at any age (Olusanya, Neumann & Saunders, 2014). WHO defined “disabling” hearing loss as a permanent unaided hearing loss – in the better ear and averaged over frequencies of 0.5, 1, 2 and 4 kilohertz (kHz) – of more than 40 decibels (dB) in adults and 30 dB in children (WHO, 2014). According to the World Health Organization’s estimates, the number of people with such impairment increased from 42 million in 1985 to about 360 million in 2011. Olusanya et al. (2014) stated that in adulthood, disabling hearing loss can lead to embarrassment, loneliness, social isolation and stigmatization, prejudice, abuse, psychiatric disturbance, depression, difficulties in relationships with partners and children, restricted career choices, occupational stress and relatively low earnings. Although hearing disability is usually experienced over a lifetime, 1–10 about half of the incidence of hearing impairment in all

age groups could probably be avoided via known and proven methods (Olusanya et al., 2014).

Ototoxicity Monitoring during MDR-TB Treatment

With descriptions of the ototoxic potential of aminoglycoside drugs published shortly after they were first introduced in the 1940s (Huth et al., 2011; WHO, 2014), one would expect extensive monitoring and management efforts to be implemented; or indeed the drugs to have been withdrawn from use (Garcia-Prats et al., 2013). Durrant et al. (2009) stated that ototoxicity monitoring expresses the principles of early identification and early intervention in order to manage the effects of hearing loss on the quality of life of an individual. Therefore, one of the roles of audiological services within the broad TB programme is to provide ototoxicity monitoring to patients undergoing MDR-TB treatment in order to detect early cochlear and/ or vestibular damage (Duggal & Sarkar, 2007). The monitoring process involves having the hearing or patient's report of vestibular complaints being monitored frequently, for example, on a monthly basis for the duration of the MDR-TB treatment (Duggal & Sarkar, 2007). Other roles include reporting and advising the health care professional and patient of pre-existing risks and hearing loss occurrence, allowing changes in treatment and most importantly rehabilitation of the loss (Durrant et al., 2009). Once a hearing loss has been detected the focus thus needs to move from monitoring to treatment and rehabilitation.

Ototoxicity monitoring involves the scheduled, repeated use of hearing test on an individual over time to make decisions about the management of a condition (Dinnes, Hewison, Altman & Deeks, 2012). MDR-TB requires prolonged treatment of up to 18 to 24 months (Duggal & Sarkar, 2007; TB Alliance, 2015). Monitoring is recommended especially in the first six months where injectable drugs such as kanamycin are administered and also six months after stopping the injectable treatment, therefore the monitoring period is extended and a greater need for adherence is thus required (Brust et al., 2014; Harris, Peer, et al., 2012). In an MDR-TB context, ototoxicity monitoring services are aimed mainly at patients who are on a treatment regimen that includes aminoglycosides such as kanamycin (Durrant et al., 2009). Ideally, the services should be

available where TB treatment occurs, as a way of increasing access to the health care service (MSF, 2011).

According to Durrant and colleagues (2009), only the audiologist is endowed by the training to achieve both objectives of the ototoxicity programme through identification and diagnosis and rehabilitation of ototoxicity hearing loss and usually provides the services in a clinic or hospital setting. However, in a developing world context, due to the shortage of audiologists, ototoxicity monitoring can be performed by a non-audiologist who is trained in audiometric procedures, for example, a nurse (Durrant et al., 2009) under the regular supervision from an audiologist. The non-audiologist could conduct the actual hearing screening and identification whilst the audiologist manages the programme (i.e. quality assurance) and the interventions.

There are guidelines available for monitoring ototoxicity such as the ASHA (1994) guidelines. Currently, there are no guidelines specific to South Africa. It would be ideal to have the procedures tailor-made for South Africa, with its unique context in mind. However, in the Western Cape Province, guidelines are being developed (C. Rogers, personal communication, December 6, 2013, K. Jacobs, personal communication, February 9, 2015). Duggal and Sarkar (2007) and Durrant et al. (2009) outlined the following recommended strategies for ototoxicity monitoring:

1. A baseline audiogram is completed in order to establish if there is any risk factor or pre-existing hearing loss present and should be conducted within 72 hours of drug administration. It also permits comparison to the results of subsequent monitoring tests. All baseline testing should be completed prior to any ototoxic drug administration where possible, if not, within two days of drug administration especially with chemotherapy because of the fast effects of the drugs (Duggal & Sarkar, 2007). Baseline testing should be comprehensive and include pure tone thresholds in the conventional frequency range and high frequency range, tympanometry, speech audiometry and otoacoustic emissions. High frequency audiometry from 10 kHz to 16 kHz is the most sensitive test to ototoxicity followed by audiometric frequencies from 3 kHz to 8 kHz then 250Hz to 2 kHz being the least sensitive and last acoustic reflex thresholds.

2. Serial audiograms are used to detect changes in pure tone thresholds. The intervals for performing the hearing tests are determined by the feasibility in the different clinical contexts. Ideally for aminoglycoside antibiotics, monitoring should be conducted weekly or bi-weekly for the duration of the treatment (Duggal & Sarkar, 2007).
3. To classify a significant change in hearing due to the development of ototoxic hearing loss, ASHA (1994) guidelines suggest using the following criteria: a significant hearing threshold change is defined as a 10 dB HL change in two consecutive frequencies, a change of greater than 20 dB HL in any one frequency, or an absence of response at 3 consecutive test frequencies in which responses were previously present and this is across the 250Hz to 8 kHz frequency range (Durrant et al., 2009). Both high frequency audiometry and OAEs are more sensitive than conventional audiometry and can detect hearing loss before conventional audiometry detects it (Durrant et al., 2009). However, in South Africa high frequency audiometry is rarely used because the equipment is expensive and less portable compared to OAEs (Khoza-Shangase, 2011).
4. Ideally, an exit audiogram will then be completed when the patient leaves or completes the treatment. However, because ototoxic hearing loss can occur up to six months after completing treatment, post-treatment evaluation is required to ensure that the hearing has stabilized (Durrant et al., 2009; Harris, Peer, et al., 2012; Huth et al., 2011).

Decentralisation of Management of MDR-TB

Prior to late 2011, national policy guidelines on the management of MDR-TB mandated that all MDR-TB patients be initiated on treatment only after they had been admitted to the country's few specialised TB hospitals (Department of Health, 2011). However, due to limited bed capacity in these TB hospitals most patients faced long waiting periods before they could start their MDR-TB treatment. For instance, in 2010 alone almost 7,400 cases of MDR-TB were diagnosed from a number of provinces in the country, and these new cases far outstripped available bed capacity in these facilities (Department of Health, 2011).

Since patients were treated on an inpatient basis prior to 2011, ototoxicity monitoring services for MDR-TB patients were therefore also provided mainly at TB hospitals. Patients often stayed in hospital for approximately 6 months which was ideal for ototoxicity monitoring because they could be monitored for the entire duration that they were being treated with aminoglycosides. However, policy on the management of drug-resistant TB underwent some extensive review. In August 2011, the Department of Health released new policy guidelines on the management of MDR-TB, which prescribed the decentralisation of management of MDR-TB (Department of Health, 2011). The primary objectives of this new management model included improving MDR-TB case detection, improving treatment outcomes and also decreasing MDR-TB transmission (MSF, 2011). This meant that MDR-TB patients will only be admitted in the hospital only if it is clinically indicated, namely in the case of very ill patients, who comprise roughly 10% of the MDR cases (Department of Health, 2011, TB Alliance, 2015). Primary health care doctors now had the responsibility to initiate treatment and review monthly in local clinics. The daily DOTS and nurse management were to be conducted in the clinics as well as the integration with HAART provision. In addition, individual counselling, home visits, support groups, social worker support and audiometry screening services were to be conducted locally (MSF, 2011).

The provinces of KwaZulu-Natal and Western Cape were the first to adopt the decentralised or community-based MDR-TB treatment model which allowed patients to access MDR-TB treatment almost 30 days earlier than in the hospital-based system (Integrated Regional Information Networks, 2012). Treatment in the community permitted MDR-TB patients to be treated as outpatients. The implications of decentralisation of MDR-TB management regarding ototoxicity monitoring then meant that services will also be provided locally and not only at the tertiary hospitals (MSF, 2011).

The Western Cape, where the current study was conducted, is geographically, the fourth largest province in South Africa The population for the Western Cape for 2010 is estimated at 5.22 million people and represents approximately 10% of the total national population. The population is relatively young with 56.21% of the regional population

being younger than 30 years of age. Furthermore, approximately 51.9% of the population is female. According to the most recent population census the coloured demographic group represents more than 50% of the total population of the Western Cape; this is followed by the Black, White and Asian demographic. In the Metro District the PHC utilisation rate correlates with the daily migration of employed persons who seek some health services close to the places of employment, the unemployment rate, household income and modes of transport.

Adherence to Monitoring Services

The success of monitoring depends on adherence among other factors. Adherence to prescribed therapies is a key factor in maintaining health in individuals with chronic illness (Sabati, Snyder, Edin-Stibbe, Lindgren & Finkelstein, 2001). Adherence is defined as 'the degree to which an individual follows a health related recommendation' (Shapiro & Shapiro, 2010, p. 324). The term adherence is preferred to compliance as it suggests active participation from the patient; whereas compliance implies a passive role (Shapiro & Shapiro, 2010). One therefore cannot always assume that patients will follow recommendations for management, even for potentially life-threatening diseases. One South African study conducted in KwaZulu Natal by Govender and Mash (2009) found that over one third of patients (34%) did not adhere to TB treatment. Factors associated with non-adherence included travel time and the relationship with TB nurses (Govender & Mash, 2009). The non-adherers may therefore more likely to become MDR-TB patients due to the lack of adherence.

In the United States, non-adherence to breast cancer medication has been proven to negatively impact the health system, causing 125 000 deaths annually and resulting in between 10-23% of hospital and nursing home admissions (Moore, 2012). It is known that drug resistant infections are on the increase and non-adherence to medical treatment has a role to play in this. The cost of non-adherence to drug-resistant infectious diseases was estimated to be between US$100 and 200 million in the United States alone per year (Rapoff, 2010). Thus, non-adherence also affects the cost-effectiveness of medical care and the clinical decisions that need to be made (Rapoff, 2010). Given the magnitude of non-adherence associated issues in a well-resourced country, management of adherence

issues in treatment programmes should be a key focus in developing countries such as South Africa. While the effects of non-adherence to ototoxicity monitoring services are not fatal, they certainly can negatively impact the health and well-being of patients should progressive, potentially, severe to profound hearing loss not be identified and managed appropriately.

Patient adherence is required during the treatment of MDR TB in order to fully benefit from the ototoxicity monitoring services where patients need to undergo a hearing test bi-weekly or monthly (Duggal & Sarkar, 2007). However, no information regarding adherence to the monitoring protocol was available in the two facilities in which the current study was conducted; although there were perceptions that attendance at the audiology services was sub-optimal. Knowledge regarding utilisation of services could become the foundation for programme evaluation and planning, thus this study was conceptualised. The next section will discuss some of the known barriers and facilitators to the success of monitoring programmes.

One of the obstacles to ensuring that monitoring services are effective is a lack of a comprehensive and holistic understanding of barriers to, and facilitators of, treatment adherence. A systematic review of qualitative studies investigating adherence to preventative and curative TB on patients, caregivers or health care providers was conducted by Munro et al. (2007). The authors concluded that a wide range of interacting factors impact on treatment-taking behaviour and patient behaviour may change during the course of the treatment (Munro et al., 2007). More patient-centred interventions are therefore needed to improve treatment adherence (Munro et al., 2007).

WHO (2014) stated that there are five interactive dimensions that affect adherence in healthcare service utilisation. These five dimensions are: health care team and system-related factors, social/economic-related factors, patient related factors, condition-related factors and therapy-related factors (WHO, 2014). A review of literature pertaining to monitoring other chronic conditions, will give insight into some of the issues that affect the use of services in a monitoring system. These will be framed according to the five WHO dimensions which will be applied to ototoxicity monitoring as

there is little or no available literature on the topic. Identifying potential barriers to adherence and implementing intervention strategies to enhance adherence, will thereby improve clinical outcomes (Moore, 2012).

Factors that Influence Utilisation of Health Services

Health Care Team and System-Related Factors

a. **Logistics.** The first factor that impacts utilisation is the physical distance and time taken to reach the health care facility. Freitas, Tura, Costa and Duarte (2012) stated that the proximity of health care services can be predictive of adherence in a population-based breast cancer screening programme. In the Tshwane region of the Gauteng province, South Africa, three community health care centres were the subject of a study by Nteta et al. (2010) on the utilisation of primary health care services. Their findings showed that the facilities were accessible to most participants who lived within 5 km or travelled 30 minutes or less to such a clinic. By making health care services accessible, this has helped to improve the utilisation rate of the services as individuals now travel shorter distances to health care centres (Nteta et al., 2010). Based on this reasoning, the proximity of the ototoxicity monitoring services (in this case, the area from which a patient is referred) was expected to be a facilitator to the use of these services. However, TB patients are often very ill, especially when first diagnosed (TB Alliance, 2015) so this patient population could be different from others who use local facilities for routine purposes such as immunisation or maintenance of chronic conditions such as hypertension.

b. **Waiting period within the health care system.** The time taken for an individual from inclusion in the MDR-TB programme to the first audiologic test was explored in this study. Nkosi et al. (2013) found that a considerable number of MDR-TB patients deceased in the interval between diagnosis and referral, thereby highlighting the importance of a stringent, timely and effective referral system for this extremely vulnerable patient group. The above mentioned external variables are indeed important in bringing about

adherence to healthcare service utilisation but if a dysfunctional health care system is in place it renders them inadequate.

c. **Health promotion.** Health professionals can disseminate information about screening or monitoring services effectively, thereby increasing awareness of the services provided (Freitas et al., 2012). Despite increasing awareness of the services, patients may still lack understanding of the importance of adherence, which is one of the factors that contribute to non-adherent behaviour (Moore, 2012).

d. **Support networks.** These can be in the form of family or health professionals (Maldaner et al., 2008). Freitas et al. (2012) affirmed that the interaction between patient and health care providers plays a key role in adherence. Nteta et al. (2010) reported that unfriendly and uncaring behaviours of health care workers affected the use of health care services in their study. In support of this finding, Govender and Mash (2009) suggested that relationships between patients and TB staff, in a South African setting, would be enhanced by improving communication skills of TB nurses. A case study was conducted by van der Walt (2004) at a tuberculosis control programme in the Western Cape Province. The findings showed that participants' responses on the whole indicated that the group of white nurses were less angry and judgemental about their TB patients than were their coloured[1] counterparts. It appeared that when patients were seen as different by the nurses in terms of class, race, income, educational background, closer contact was less threatening. She further suggested that because the study was conducted in post-apartheid South Africa, the white nurses' tolerance may have been strengthened by guilt (van der Walt, 2004). Although not focused exclusively on TB treatment or primary health care facilities, a report by Vivian, Naidu, Keikelame and Irlam (2011) highlighted continued concern regarding the abuse of patients' human rights in South African health care facilities. Thus, it could be argued that the

[1] In South Africa the term coloured (also written Coloured) is used to refer to people of mixed-race parentage rather than, as elsewhere, to refer to African peoples and their descendants (i.e. as a synonym for black). Under apartheid it was imposed as an official racial designation. However, in modern use in South Africa the term is not generally considered offensive or derogatory.

quality of interactions with the health professionals might impact the use of ototoxicity monitoring services.

Social/Economic Related Factors

e. **Getting time off work**. Difficulty getting time off from work to attend a clinic was noted by Nteta et al. (2010) as a barrier. Burdensome work schedules are associated with poor adherence to medication regimen in patients with breast cancer receiving oral therapies (Moore, 2012). Despite cancer and tuberculosis being different diseases, both require adherence for the success of the treatment therapy respectively.
f. **Family support networks.** When managing a patient, the International Classification of Functioning, Disability and Health (ICF) framework recommends including the individual's family in the management (WHO, 2001). Evidence has been found that significant others have positive impact on the patient's progress in rehabilitative context (WHO, 2001). Maldaner and colleagues' (2008) study of patients undergoing haemodialysis treatment reported support networks as one of the factors that influence the utilisation of services. If the family or spouse is supportive and constantly reminds the patient, he/she is most likely going to go through the treatment and complete it (Maldaner et al., 2008). Nteta et al. (2010) confirmed the impact of family influence on the patient in the utilisation of primary health care services.

Ushie and Jegede (2012) reported that co-infection with TB and HIV is a source of tension in the family. Their study set in Nigeria, examined circumstances under which family support promotes or hinders adherence to treatment for HIV and TB/MDR-TB co-infected patients. Findings showed that overall, family support does promote adherence. Family support may however, have negative effects on adherence when the patient perceives that the support is being given with ulterior motives. For example, gossiping about the patient and when the patient has the primary source of income (for example, the recipient of a social grant) he/she may feel that his/her role is being undermined. The same authors argued that the stigma about HIV made some participants less likely to come forward for treatment even if they had only TB because of the association between

TB and HIV (Ushie & Jegede, 2012). These findings may be applicable in the South African context where co-infection with TB and HIV is also common (Harris, Bardien, et al., 2012).

Patient Related Factors

1. **Self-efficacy**

Self-efficacy has been identified as an important determinant of rehabilitation adherence (Levy et al., 2008). Moore (2012) wrote that patients who have a high level of control over their health are likely to adhere to their prescribed regimen. Levels of self-efficacy differ (Morris & Schulz, 1993 as cited in Moore, 2012) among individuals with a similar socio-economic status and education level, but adherence is superior in those with high self-efficacy skills (Moore, 2012).

2. **Attitude and beliefs**

Levy et al. (2008) reported that attitude of patients and their perceived severity of sport injury were found to predict the intention of making use of rehabilitation services. Attitude and beliefs greatly shape an individual's behaviour, in terms of whether he/she will observe the outlined recommendations or not (Levy et al., 2008). In line with this variable, Shelton, Jandorf, Ellison, Villagra and DuHamel (2011) introduced the notion of fatalism. Fatalism is defined as 'a belief that a person's behaviour does not exert control over events that happen' (Shelton et al., 2011, p. 926). This research questioned, in the context of ototoxicity monitoring, if resignation with regards to the development of hearing loss promoted the non-use of ototoxicity monitoring services. Maldaner et al. (2008) conversely argued that accepting the disease as a factor that positively influences adherence. Hence, if patients are in denial regarding the diagnosis of TB, resignation could become a barrier to the utilisation of the services. Acceptance can thus be a facilitator for some individuals to have their hearing continuously monitored even if a hearing loss has already been acquired because they accept having TB and the ototoxic consequences that comes with it.

Belief in the supernatural and traditional healers remains a feature in the South African cultural medical paradigm due to the difference in worldview between modern and traditional cultures; which tend to shape people's perception of health matters (de Andrade & Ross, 2005). A strong belief that disease can be brought on by spiritual pollution is common within the traditional philosophy (de Andrade & Ross, 2005). A traditional healer is defined as 'someone who is recognized by the community in which he lives as competent to provide health care services' (Pretorius, de Klerk & van Rensburg, 1993, p.5). It is estimated that eight out of ten black South Africans consult traditional healers in conjunction with modern Western health professionals (de Andrade & Ross, 2005). de Andrade and Ross (2005) stated that traditional healers may be more physically and geographically accessible to the people and approximately 2.9% consult traditional healers for ear-related problems. They further noted that traditional medicine tries to explain why a particular person has been affected at that point in time, thereby introducing the notion of a cosmological aspect to the disease. Therefore, despite the medical professional having explained the cause of the disorder e.g. hearing loss due to ototoxic effects, there is a chance that patients could still ascribe the hearing loss to supernatural causes. In de Andrade and Ross' study they found that ten of the fifteen traditional healers interviewed credited the cause of hearing loss to ancestors, above other aetiologies such as noise exposure or congenital factors and only four traditional healers attributed it to bewitchment. Due to the regard of communities for traditional healers and the ease of access, it is suggested that collaboration of health care professionals and traditional healers could be beneficial (de Andrade & Ross, 2005).

3. Age

Age is a factor reported as affecting adherence or service utilisation, but inconsistently (WHO, 2014). Scott (2009) reported on a study conducted on patients who are prescribed medication to treat high cholesterol. The findings showed that more than 50% of patients under the age of 45 were not optimally adherent to their therapy with 58% of adults between the ages of 18 and 34 not taking their cholesterol-lowering medications as prescribed (Scott, 2009). Achmat and Roberts (2006) however indicated that patients can feel disempowered especially older adults from disadvantaged

backgrounds, who may have previously experienced a more patriarchal health care system thereby affecting their adherence and utilisation of the health care facilities.

4. **Health literacy**

The extent to which a patient can read, understand and carry out the health recommendations plays a role in how well a patient will follow a prescribed regimen (Ross, 2007). There is a low education level among adults in the Khayelitsha community (City of Cape Town, 2011) therefore it is possible that patients may struggle with understanding and following the recommendations given to them thus hindering adherence. A study conducted by Schmidt von Wühlisch and Pascoe (2010), based in Cape Town, found that patients in the health care sector frequently struggle to understand and remember details of clinical information and the reasons underlying their treatment. As a result they often do not adhere to clinical instructions and recommendations causing reduced effectiveness and efficiency of health care interventions (Kessels, 2003 as cited in Schmidt von Wühlisch & Pascoe, 2010).

Condition-Related Factors

Hearing loss as a condition-related factor was explored since adherence can be affected by the absence or severity of a hearing loss (Garstecki & Erler, 1998). Greater hearing loss was seen to play a critical role in influencing better adherence to health care services in a study conducted by Garstecki and Erler (1998). Conversely, Fallabi-Stubi et al. (1998) reported that compliance with treatment in a TB programme decreased over time because patients were asymptomatic. It is therefore often difficult to convince patients of the importance of taking their medication for several months (Fallabi-Stubi et al., 1998). Extending this notion, it is possible that due to the effects of hearing loss not being immediately apparent, patients may not appreciate the perceptible benefit of monitoring their hearing and are less likely to adhere or persist with the programme (Moore, 2012).

Therapy-Related Factors

Factors related to therapy which may impact adherence include the duration of treatment, previous treatment failures, frequent changes in treatment, the immediacy of beneficial effects, side-effects, and the availability of medical support to deal with them. (WHO, 2014). MDR-TB treatment is lengthy and complex often with unpleasant side effects which affect adherence to treatment (Duggal & Sarkar, 2007; TB Alliance, 2015). Patients might be too ill to walk to where the services are for their treatment or ototoxicity monitoring and in some cases they are hospitalised thereby affecting adherence (MSF, 2011; TB Alliance, 2015).

Problem Statement

The management of MDR-TB in general presents some challenges. These challenges that occur as MDR-TB treatment tends to be lengthy and difficult (Duggal & Sarkar, 2007; TB Alliance, 2015). Prior to the introduction of the decentralised model of management of DR-TB, patients treated with aminoglycosides were often audiologically monitored at TB hospital as inpatients (Western Cape Government, 2011). The transition for monitoring inpatients to outpatients therefore made the ototoxicity monitoring services more accessible at a community level in one area (e.g. Khayelitsha sub-district), while the central TB hospital offered an outpatient service as well. However, uptake of such services was not known. This study therefore aimed to explore the barriers to and facilitators of the utilisation of ototoxicity monitoring services when such services are provided under an outpatient MDR-TB model of care.

Study Rationale

This study was set to identify the factors that would facilitate individuals to make use of ototoxicity monitoring services. The shift in policy towards decentralisation would hopefully signal the political will to prioritise treatment of TB in the community. In addition it would be hoped that this will include monitoring for, and response to, the adverse effects of TB, including hearing loss. Considerable resources have been invested in order to establish these services therefore information regarding their uptake is important. Identifying the facilitators and barriers would help inform service delivery,

thereby improving the effectiveness in providing ototoxicity monitoring services to the public. While cost-effectiveness per se will not be evaluated, it could be argued that to provide services, which are not used to maximum impact, is not efficient spending of health care budgets.

Chapter Three: Methodology

Introduction: This chapter will present a description of the research methodology used in this study. This study was conducted in two phases, and therefore the study design, data collection methods and procedures, reliability and validity issues will be described separately for each of the two phases. The chapter will close with a description of ethical considerations applicable to both phases.

Aims & Objectives

The study had two aims. First, to determine the pattern of the utilisation of ototoxicity monitoring services when provided on an outpatient basis. Second, to explore factors that act as facilitators of and barriers to the use of ototoxicity monitoring services for outpatients receiving treatment for MDR-TB. The study was conducted in two phases to address each of the aims of the study.

Phase 1

Aim

To determine the pattern of utilisation of ototoxicity monitoring services for patients with MDR-TB who accessed treatment on an outpatient basis.

Objectives

1. To describe the pattern of utilisation of ototoxicity monitoring services for outpatients with MDR-TB using descriptive statistics at a central TB facility.
2. To describe the factors associated with attendance of available ototoxicity monitoring for outpatients with MDR-TB. The following variables were used: age, gender, treatment regimen, place of referral, initial hearing status, development of hearing loss, disabling hearing loss and attendance.

Phase 2

Aim

To explore factors that act as facilitators of and barriers to the use of ototoxicity monitoring services for patients who are receiving their treatment for MDR-TB as outpatients.

Objectives

1. To develop and pilot a questionnaire based on literature, which explores patients' opinions regarding the barriers and facilitators of use of audiological services.
2. To administer the finalised questionnaire to patients with MDR-TB who were currently accessing treatment on an outpatient basis to investigate the factors that impact the utilisation of the ototoxicity monitoring services.

Below is a flow chart of a diagram summarizing how the methodology will proceed (see Figure 1).

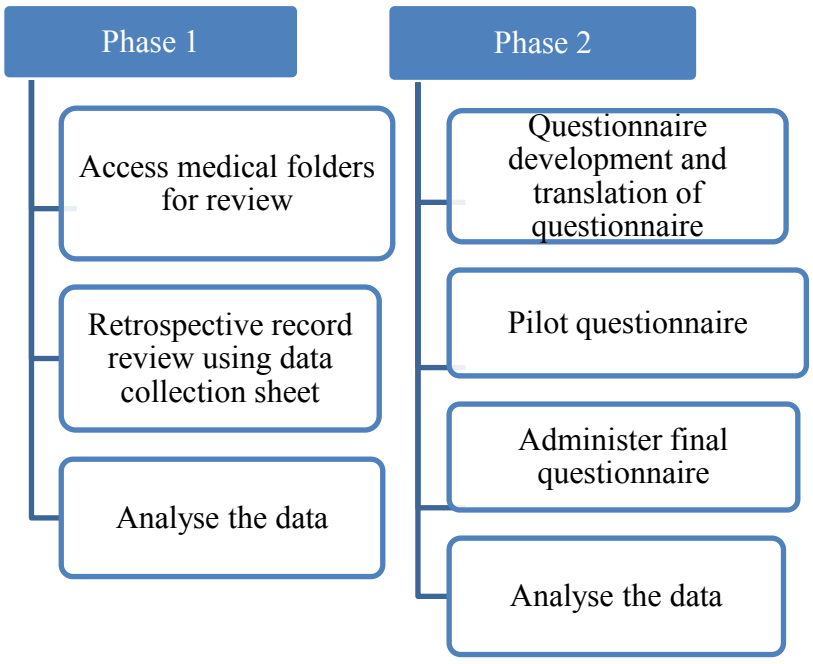


Figure 1: Flow chart of methodology

Study Context

The study was conducted in Cape Town Metropolitan area at two facilities which provide MDR-TB care on an outpatient basis. Facility 1 was located in a more central location in the Metropole, whereas facility 2 was located in one of the biggest townships in the Cape Town Metropole.

Description of the Two Facilities

Facility 1: A centrally located TB hospital. The facility has 350 in-patient beds and is meant for long-term admission of MDR-TB patients. The facility also has a large outpatient department which receives referrals from as far as the Cape Winelands (approximately 167km away) and Eden area of Western Cape which is approximately 431km away.

At this facility, ototoxicity monitoring for MDR-TB patients is done bi-weekly or monthly according to the audiologist's decision, taking into account each individual's hearing status. The decision is guided by evidence based guidelines. The patient has to attend the first hearing test appointment and from then, would be given a subsequent follow-up appointment. The same routine is observed for all the follow-up visits. The resident audiologist conducts the pure tone air conduction test in an audiometric booth. The facility is also responsible for ototoxicity monitoring of patients referred from neighbouring primary health care facilities.

Facility 2: A primary health care facility in a peri-urban township on the outskirts of Cape Town; characterised by a mixture of formal and informal housing and a lack of access to basic services (City of Cape Town, 2011). Its population, according to the 2011 census, was 392 749 with mostly Xhosa-speaking people (City of Cape Town, 2011). A study previously carried out in this community showed that there is an extremely high burden of MDR-TB; estimated at 51/100,000/year (Cox et al., 2010). Cox et al. (2010) stated that in 2008, the two clinics in this community were responsible for diagnosing and treating approximately 50% of TB cases in Khayelitsha. Ototoxicity monitoring was set up at a central location (community health clinic) and all MDR-TB patients from the neighbouring 13 primary health care clinics were referred there. The monitoring is conducted by a trained lay-person on a monthly basis while the patient usually attended

the clinic daily for DOTS (MSF, 2011). The overall management of the programme is conducted by an Audiologist.

Phase One Retrospective Record Review

Research Design

This study was a descriptive, quantitative research study in that it was concerned with identifying patterns or trends in a situation, without regard to causal or other hypothesis (Grimes & Schulz, 2002). A descriptive, quantitative study uses numerical analysis and places emphasis on objective measurements of data collected through polls, surveys or questionnaires and establishes only associations between variables (Hopkins, 2000). A retrospective record review of patient medical records was conducted which investigates the past and involves viewing data that have already been collected, using pre-set criteria and standards (Jansen et al., 2005; Zegers et al., 2007). The advantages of using a retrospective record review are that it is easy to perform and it is also economical. The disadvantages are that relevant information might be missing from the patients' records or that patients' records do not detail the associated reason behind choices made, such as why the patient utilised or did not utilise the ototoxicity monitoring services (Jansen et al., 2005).

Participants

Medical records of adult patients who were accessing treatment for MDR-TB, as outpatients at a central-TB hospital based in Cape Town, South Africa were reviewed.

Inclusion criteria

- Patients treated for MDR TB with a regimen that includes an aminoglycoside.
- Patients who accessed ototoxicity monitoring services as outpatients at a central TB facility from January 2012 up to March 2013 when the record review was conducted.

Exclusion criteria

- Inpatients were excluded because it is more feasible to monitor inpatients and ototoxicity service utilisation on an outpatient basis was being explored.
- Newly diagnosed TB patients who only had one hearing test appointment scheduled at the time of the review were excluded as a trend for attendance could not be assessed with just one visit. At least two hearing test appointments were required to have been scheduled after commencing MDR-TB treatment in order for a pattern to be drawn.
- Participants with missing information pertinent to the study such as treatment regimen were also excluded from the study.

Sample Size

A total of 860 medical folders were reviewed and out of those, 59 records did not meet the inclusion criteria and were ineligible due to missing information pertinent to the study, leaving 801 folders to be used in the study. For a descriptive quantitative study, Fox, Hunn and Mathers (2009) suggested using the following formula below in order to obtain the required sample size of 385 which was considered adequate for this study.

$$N = \frac{P\,(100\% - P)}{SE^2}$$

where confidence level is 95%, p=50% and the standard error being 2.55

$$= \frac{50\%\,(100\% - 50\%)}{2.55^2} = \frac{2500}{6.50} = 384.6 = 385$$

Based on the calculations, the sample size of 801 was therefore adequate for the purpose of this study.

Data Collection Tool

A data collection sheet was developed for the purposes of this study. Key areas of interest were derived from recommendations from the literature and included in the data collection sheet, (see Appendix A). The same information that was on the data collection sheet was then placed onto an M.S. Excel spread sheet for transferring the data onto a password protected computer.

Research Staff

The primary researcher conducted the record reviews of the participants. No other research staff members were involved.

Data Collection and Procedure

Ethical clearance was sought and obtained from the Faculty of Health Sciences Human Research Ethics Committee at the University of Cape Town, (HREC REF: 604/2012, see Appendix B and C). Permission to conduct the study was obtained from the Provincial Government of the Western Cape (PGWC) before any part of the study was conducted; in order to access patient files (RP 168/2012 see Appendix D). Once permission was granted, the data of all the MDR-TB outpatient files in the audiology department were reviewed on-site. Patients who did not make it into the audiology department system via the first hearing test were therefore lost in the referral system whether due to being ill, died or being discharged (Nkosi et al., 2013). The files were drawn, the data collection sheet completed and transferred to Excel. Quality assurance procedures were followed then the data was coded and analysed.

Data Analysis

Analysis of data was done to investigate how the following factors influence patterns of utilisation of services: age, sex, treatment regimen, place of referral, waiting period from the time of inclusion in the MDR-TB programme to the first audiologic assessment, initial hearing status, development of hearing loss and the presence and/development of disabling hearing loss. Only the first six appointment visits were reviewed despite ototoxicity monitoring being conducted either bi-weekly or monthly. Six visits is the minimum number of audiologic visits expected because ototoxic aminoglycosides are given daily for the first six to eight months (Brust et al., 2014; TB Alliance, 2015).

Both descriptive and inferential statistical methods of data analysis were used. Descriptive statistics such as the mode and median were used to provide a summary of the data collected. In addition the variables that influenced attendance were assessed with the relative risk estimation by log-binomial regression using the generalised linear

modelling. When the outcome event is common as in case of this study, (incidence of 10% or more) (Lindquist, 2014), it is often more desirable to estimate a relative risk/risk ratio (RR) instead of using odds ratio (OR) since there is an increasing differential between the RR and OR with increasing incidence rates (Greenland, 2004; McNutt, Wu, Xue & Hafner, 2003; Zou, 2004). The log-binomial model has been proposed as a useful approach to compute an adjusted relative risk as it produces an unbiased estimate of the adjusted relative risk (McNutt et al., 2003). From the results obtained, variables that were statistically significant had a p-value <0.05 and an RR value < 1 for any specific variable indicated less likelihood of attendance of a hearing test appointment when compared to the reference variable (Harrell, Califf, Pryor, Lee & Rosati, 1982). An RR value greater than 1.0 indicated more likelihood of attendance when compared to the reference variable (Harrell et al., 1982).

Classification of Hearing Status

The hearing status at the initial hearing test appointment was used to categorise hearing loss according to Margolis and Saly (2007) where normal hearing was ≤ 25dB HL and hearing loss was ≥26 dB HL. WHO uses 0.5 kHz, 1 kHz, 2 kHz and 4 kHz pure tone averages to define disabling hearing loss (WHO, 2010). Standard pure tone averages of 0.5 kHz, 1 kHz and 2 kHz were however used because Valete-Rosalino and Rozenfeld (2005) stated that these frequencies are considered important in the identification of the disability related with hearing. Development of ototoxic hearing loss was described according to the ASHA (1994) criteria where a significant hearing threshold change is defined as a 10 dB HL change in two consecutive frequencies, a change of greater than 20dB HL in any one frequency, or an absence of response at 3 consecutive test frequencies in which responses were previously present and this is across the 0.25 kHz to 8 kHz frequency range. Development of hearing loss was assessed only for patients who attended more than once in order to ascertain any shift in their hearing thresholds. A disabling hearing loss was described using the criteria from WHO which refers to hearing loss greater than 40dB HL in the better hearing ear in adults and a hearing loss greater than 30dB HL in the better hearing ear in children (WHO, 2014). The use of the best ear is justified by the fact that the worst ear tends to be compensated by the function of the better ear (Valete-Rosalino & Rozenfeld, 2005).

Phase Two Questionnaire development and Administration

Research Design

An exploratory quantitative approach was used. Salkind (2012) stated that an exploratory study is conducted in order to provide insight and understanding through the use of a survey questionnaire. Mitchell and Jolley (2012) stated the advantages of using a survey as that a large amount of information can be collected from a large number of people in a short period of time and in a relatively cost effective way. In addition, the results of the questionnaires can usually be quickly and easily quantified and can also be analysed more objectively than other forms of research. However, if the participant's self-report is inaccurate, the survey will have poor construct validity (Mitchell & Jolley, 2012). In addition, the survey is argued to be inadequate for understanding some forms of information, for example, changes of emotions, behaviour, or feelings (Mitchell & Jolley, 2012). The latter was addressed in the administration of the final questionnaire where participants were given an opportunity to give the reasons qualitatively, behind choices made regarding utilisation of the services.

Participants

Participants were adults who were receiving treatment for MDR-TB as outpatients at a central TB hospital and at a primary care clinic between April 2013 and September 2013.

Inclusion criterion. The inclusion criterion was MDR-TB individuals exposed to aminoglycoside treatment who were currently receiving treatment and were 18 years of age and older at the time of the study.

Exclusion criteria. The exclusion criterion were participants who took part in the pilot study (described on page 43), those who had completed their TB treatment and, inpatients at facility 1. By default those who were not using the facility even though this had been recommended were excluded since a convenience sampling strategy was used.

Sampling Frame

According to Gross, Mallory, Heiat, and Krumholz (2002), a sampling frame is the set of source materials from which the sample is selected. In this case it was adult MDR-TB outpatients, receiving aminoglycoside treatment from Facility 1 or 2. In a sampling frame, patients undergo eligibility screening to determine the eligibility fraction (Gross et al., 2002). The eligibility fraction in this study included those on aminoglycoside TB treatment and were 18 years of age and older. Those eligible for participation were then asked for informed consent. There were 90 people in the sampling frame, 10 were screened, 6 did not give consent to participate and 74 were included in the study.

Recruitment Strategy

At Facility 1, the recruitment strategy was to approach potential participants from the Audiology Department after attending their hearing test appointment. At Facility 2, participants were recruited at the clinic when they came for their DOTS visits or attended the MDR-TB support group. The purpose of the study was explained to them (see Appendix E) and informed consent was then sought from them to participate in the study (see Appendix F). Participants were approached by the researcher at Facility 1 and the help of the support group facilitator was used at Facility 2.

Sampling Method

A convenience, non-random sampling method was used. Convenience sampling makes use of readily available people who volunteer to participate in the study (Burns & Grove, 2001; Terre Blanche et al., 2006). This sampling method should however, be used with caution as the participants may be atypical and introduce bias to the study (Polit & Beck, 2008). The major obstacle with the sampling strategy was that the non-attendees could not be surveyed in order to give insight to their barriers to service utilisation.

Sample Size

For a quantitative study, a large sample is recommended, the larger the sample the more representative it is (Polit & Beck, 2008). A sample size calculation suggested having 348 participants (Raosoft, 2004). The calculation was based on the normal distribution and the following formula was used:

Sample Size = $(z^2 x\ p\ x\ (1-p)/m^2$

Confidence Interval (m) = $\sqrt{\frac{(z^2\ x\ p\ x\ (1-p))}{\text{sample size}}}$

Where,

Z = Confidence Level (E.g. 1.96 for 95% Confidence Level),

p = Worst case percent (Default value: 0.5),

m = Margin of error (or) Confidence Interval.

A total of roughly 860 MDR-TB registered outpatients were seen at the Audiology Department at Facility 1 from January 2012 to the period of the study and about 317 MDR-TB patients were seen at Facility 2 (K. Jacobs, personal communication, December 9, 2013). The recommended sample size was based on a 95% confidence level and +/-5% margin of error (Polit & Beck, 2008). According to Burns and Grove (2001) there is however, no hard and fast rule about the sample size for a quantitative study and a sample of at least 30 participants should be used. A total sample size of 74 participants was used and given the exploratory nature of this study, this sample size was therefore considered adequate.

Data Collection Tool

The primary data collection tool for phase two was a questionnaire (see Appendix H for the final questionnaire) developed specifically for the purpose of this research. The questionnaire was carefully piloted and necessary changes made before it was administered to the main sample.

The questionnaire used a structured four-point Likert scale response format to avoid the neutral response. A Likert scale is appropriate as it allows the answers to be weighted, allowing for more natural responses (Ghurman, 2010). Traditionally, Likert format is a five-point scale, in which the options are 'strongly agree', 'agree', 'neutral', 'disagree' and 'strongly disagree' (Kaplan & Saccuzzo, 2009). Using even numbers on a Likert scale forces the respondent to choose an option hence giving better responses (Ghurman, 2010; Polit & Beck, 2008).

Questionnaire Development

Step 1. The first step was to develop the draft questionnaire using literature (see Appendix G). According to Trochim (2006), the actual process of developing a questionnaire comprises the following steps:

1. Determining the question content, scope and purpose.
2. Choosing the response format that will be used for collecting information from the respondents.
3. Wording the question appropriately in order to get at the issue of interest.

Some of the qualities that make a good question are noted below (Bright, 2009) and were adopted during the development of the questionnaire:

1. Asks for an answer on only one dimension.
2. Can accommodate all possible answers.
3. Have mutually exclusive options.
4. Produces variability of responses.
5. Follows comfortably from previous questions.
6. Does not presuppose a certain state of affairs (the phrase 'do you think' was continuously used in the questionnaire to address this point).
7. Does not imply a desired answer.
8. Does not use emotionally loaded or vaguely defined words.
9. Does not use unfamiliar words or abbreviations.
10. Is not dependent on responses to previous questions for example, in question 2, even if the participant has never missed an appointment before, they were

asked if they would miss it because of different reasons given (see final questionnaire Appendix H).

Step 2. The next step was using a modified Delphi technique to gain consensus about the content and wording of the questions formulated which is suggested by Mayland, Williams and Ellershaw (2011) when developing a questionnaire. Therefore a Delphi panel of five members was assembled to review the questions proposed for the questionnaire. A research information letter was given to them and consent was obtained (see Appendix I). The qualifications of the panellists were as follows: two audiologists knowledgeable in the field of ototoxicity, a doctor, nurse and an audiometrist. The last three Delphi panellists were staff members based at a clinic involved with patients on MDR-TB treatment. This was a purposive sample and the sample size for the panel was considered adequate for a Delphi panel consensus for this study (Conroy, Elliot & Burrell, 2013).

Two rounds of the Delphi were conducted based on the two-staged modified Delphi procedure (Hsu & Sandford, 2007; Reiter et al., 2007). In the first round, the draft questionnaire was either emailed or the panellists were asked for the feedback in person. The panellists were required to give comment regarding the changes that could be made to the structure and wording of the questionnaire. Space for feedback was left after each question. At the end of the draft questionnaire, the panellists were asked whether they had additional suggestions, for example, adding questions that had not been included. Results from the first iteration of the panel led to the removal of the questions in bold (see Appendix G) because there were not relevant to the particular setting or were repetition. The remaining questions were accepted immediately after one review as consensus was 80% (Olthof et al., 2013). These changes were implemented and a second Delphi round was carried out. A second draft of the questionnaire was returned to the panel and included qualitative suggestions from the first round. The second round focused on obtaining a consensus regarding the edited draft questionnaire. Consensus of 50% was reached and was adequate (Conroy et al., 2013) as no new information was obtained and no further changes or suggestions were made by the panellists. The 50% agreement was decided based on the stability of the panellists' responses from the previous round and also because only agreement, rather than new knowledge, was sought in this round (Hsu

& Sandford, 2007; Mash, Couper & Hugo, 2006). This second draft then became the final draft questionnaire (Kalaian & Kasim, 2012) (see Appendix H).

Step 3. After a consensus regarding the questions was reached, the next step was to analyse the language level of the questionnaire prior to administration to the participants. A Flesch-Kincaid analysis of the English version of the questionnaire was completed in order to analyse the language level of the questionnaire (see Appendix J). Readability level of Flesch-Kincaid grade level 3 was acceptable (Paasche-Orlow, Taylor & Brancati, 2003). Text written at a 4th-grade level would promote the autonomy of most candidates for participation in medical research (Paasche-Orlow et al., 2003). Several healthcare agencies have recommended that the readability of patient education materials should not be higher than sixth- to eighth-grade level (Badarudeen & Sabharwal, 2010) but in the South African context, considering the community in which the study was performed, grade 3 level was used.

Step 4. Once the assessment of the language level was completed, the questionnaire was translated into isiXhosa, because the population in which the study was conducted consisted predominately of isiXhosa speaking individuals. The National Language Policy Framework in South Africa states that individuals have the right to access information in the language they prefer (Constable, Mabena & Minishi-Mjanja, 2007). When translating the questionnaire, the forward translation technique was used in the translation of the original English version into isiXhosa (Wild et al., 2005). A mother tongue isiXhosa speaker who was also proficient in English and a graduate at an English medium university did the translation. After translating the questionnaire cognitive debriefing is recommended (Ploughman, Austin, Stefanelli & Godwin, 2010). It is recommended because it is part of the translation process, where people from the target population are invited to review a translated questionnaire (see Appendix K) in order to determine if the content and items are understood in the same way the researcher intended (Ploughman et al., 2010). However, this was not achieved because of the low literacy levels of the population in which study was conducted. The translated questionnaire was then piloted in order to assess the feasibility of administering the questionnaire and a backward translation was performed by a different individual in order

to check for vocabulary equivalence (Cuellar & Paniagua, 2000). Back translation is particularly valuable to researchers who do not have the proficiency in the translated language as it can assure some control over the eventual product when the back translation occurs to the source language (Cuellar & Paniagua, 2000). The results of the forward-backward translation were equivalent to the original English version.

Step 5. Piloting the questionnaire: After developing the questionnaire, a pilot study of the isiXhosa questionnaire was conducted and is discussed more in detail below. Permission to access the facilities had been obtained from PGWC (see Appendix D) and from the City of Cape Town (see Appendix L).

Pilot Study

Aim (Pilot Study): To assess the feasibility of the isiXhosa questionnaire in terms of its administration.

Objectives:

a. To identify any specific unclear items

b. To establish the average time it will take to complete the questionnaire

c. To assess if the participants can self-administer the questionnaire

Participants for the Pilot Study

Inclusion criterion. The inclusion criterion was adult, MDR-TB participants exposed to aminoglycosides at Facility 2 and who reported they could read and write in isiXhosa.

Exclusion criterion. Exclusion criterion was MDR-TB patients who were illiterate and those who had completed their TB treatment, since they no longer utilised the ototoxicity monitoring services. The current facilitators of and barriers to the use of ototoxicity monitoring services were therefore being explored.

Participants had to be able to self-administer the questionnaire without assistance in order to obtain the individual's own view without influence (Georgoudisa, Oldhama & Watson, 2001). This meant that the participants had to be functionally literate in isiXhosa in order to self-administer the questionnaire. Functional literacy is defined as the ability to understand and use printed information in daily activities in a variety of settings (Chigona, Van-Belle, Moore, Paddock & Pitout, 2005). In the community where the study was carried out, 75.4% of the adults' highest level of education is less than a matric certificate (City of Cape Town, 2005). Targeting a grade 3 literacy level was to ensure that the criterion does not automatically exclude the majority of the population, considering that there is a low literacy level among adults in this community (City of Cape Town, 2005).

Pilot Sample Size

Thabane et al. (2010) stated that a sample size in a pilot study may not be required but it must be representative of the population and have the same inclusion and exclusion criteria as the population in which the final questionnaire will be administered. Because the sample size depends on the purpose of the pilot study, a sample size of seven participants was used in this study (Johanson & Brooks, 2009).

Pilot Study Procedure

The researcher, with the help of the counsellor in charge of facilitating the support groups, approached the potential participant, explained the purpose of the study and obtained informed consent. Based on the counsellor's experience as well as the experience of other staff members at the clinic working with the TB patients, it was advised to have the questionnaire only verbally administered in isiXhosa in order to get reliable responses therefore the third objective was not explored. The participant was led into a private space where the questionnaire was researcher-administered. An open-ended question was included to ensure that if in any way the questions presented were biased, the participants still got an opportunity to inform the researcher of their reasons for utilising or not utilising the audiological services. On completion, the researcher thanked the participant for their help in the research and gave them an airtime voucher as

a token of appreciation. The time taken to administer the questionnaire was noted for each participant.

Results from the Pilot Study

From the findings from the pilot study, no adjustments were made to the questionnaire. Only one procedural change was made; having a first language isiXhosa speaker verbally administering the questionnaire instead of it being self-administered by participants. This was done because it was advised that the participants were unable to self-administer the questionnaire reliably so in order to ensure uniformity, all the interviews were conducted verbally. The average time the researcher took to administer the questionnaire was 10 minutes.

Administer Final Questionnaire at Facility 1 and 2

The procedure for administering the final questionnaire at facility 1 and 2 was that the researcher and assistant first approached the participant, explained the purpose of the study and obtained informed consent. The participant was then led into a private room or space outside where the questionnaire was administered verbally by the assistant, a first language isiXhosa speaker for isiXhosa speaking participants. On completion, the researcher thanked the participants for their help in the research. Airtime vouchers were given as a token of appreciation for participants at Facility 2.

Data Management

The raw data (completed questionnaires) were stored in a locked cabinet. Once the data had been transferred to an Excel spread sheet, results were stored on a password protected computer. No identifying information about the participant was recorded in the questionnaire and each participant was coded in terms of letters and numbers. Quality assurance to check the accuracy of the data collection was conducted and will be discussed in detail under reliability and validity.

Data Analysis

A non-parametric, Mann-Whitney U test was used to compare differences between two independent groups i.e. females and males. It allows one to inferences from the data such as stating whether the two populations differ and determining if there are differences in medians between groups (Tredoux & Durrheim, 2002). Fisher's exact test was also used because it is a similar analysis and is recommended for small size samples (Polit & Beck, 2008). Fisher's exact test is used to analyse contingency tables, which display the interaction of two or more variables, and it calculates exact statistical significance, rather than using an approximation (Foster, 2014). Gender disparities have been known to exist in the overall use of health care services but the same has not been investigated for preventative care utilisation (Vaidya, Partha, Pharm & Kamakar, 2012). A frequency count of the factors noted to influence the utilisation of ototoxicity monitoring services was conducted. Frequency count is defined as the number of times a given phenomenon appears (Polit & Beck, 2008).

Reliability and Validity

Reliability

Reliability refers to the consistency or stability of a test, the extent to which an instrument yields the same results on repeated trials (Terre Blanche et al., 2006). For the retrospective record review in phase one, in order to reduce error during data collection, quality control procedures were instituted. These procedures were on how and which data to collect, how to record potentially ambiguous information and how to distinguish between missing and inappropriate data (Tejani & Wasdell, 2010).

A potential threat to reliability in this study for phase one was that data may not be entered correctly on the Excel spread sheet. In order to address this threat, test-retest reliability was used. For test-retest reliability, 5% of the patients' data collected by the same individual was re-entered and the entries were compared using the IF() and the COUNTIFS() formula to compare the data sets (Harkins, 2012; Singh et al., 2011; Tejani & Wasdell, 2010). The formula '=IF (' was typed into any Excel cell, which prompts one to highlight the data set to be compared and specify using 'zero or incorrect' to identify a

mismatch in the data. After selecting the data, the formula was concluded by closing the brackets and pressing enter. Any errors in the data then appeared labelled 'zero or incorrect.' A similar procedure was conducted with the COUNTIFS formula to get the percentage of errors. A percentage discrepancy was used in order to accept or reject the data (Hogg et al., 2010). For data verification, 95% accuracy is usually used in health care settings (Tejani & Wasdell, 2010). No value was entered on the Excel spread sheet for any missing data and calculations were made based on the available data only. A percentage accuracy of 98% was obtained for the data.

For phase two, one way of achieving reliability was through pilot testing the questionnaire. Pilot testing an instrument allows for the identification of sources of error which would affect its reliability (Kimberlin & Winterstein, 2008). Refinement of the instrument then focuses on minimizing measurement error (Kimberlin & Winterstein, 2008). In an attempt to maintain reliability, the researcher provided training to the research assistant. In addition, the researcher sat in throughout the administration process and corrected the assistant on how to get the responses where necessary. The assistant was told not to paraphrase the questions but simply read them out and fill in the questionnaire. The participants were also advised that there was no wrong answer in order to minimise the Hawthorne effect and social desirability issues.

Validity

Construct validity means a tool is measuring what it was set out to measure without neglecting important components (Burns & Grove, 2001; Twycross & Shields, 2004). In order to ensure that the data collection sheet was valid, evidence from the literature was used to develop it for phase one (Burns & Grove, 2001; Twycross & Shields, 2004).

For phase two, content validity is one of the measures that were used to assess the validity of a tool. A rigorous way of doing so is by asking recognised experts in the area to give their opinion on the validity of the tool (Kimberlin & Winterstein, 2008; Twycross & Shields, 2004). This was achieved by conducting a literature review to develop the tool and by using the Delphi technique and pilot study to ensure that no

important components were neglected. These last two procedures ensured that the questions asked were appropriate and acceptable culturally to this population.

The challenges that were faced with the Delphi panel were the lack of understanding of the purpose of the questionnaire, which had an influence on the feedback given. This was however addressed by conducting a second round of the Delphi technique and gaining consensus.

Internal validity was addressed by having standardized instructions for the researcher-administered questionnaire (McLeod, 2013). External validity can be improved by setting experiments in a more natural setting (McLeod. 2013) and this was implemented by having the questionnaire administered in a room the participants use regularly for counselling or outside where the patients met for their support group in the shade.

Ethical Considerations

The Declaration of Helsinki (World Medical Association, 2008) was used as a guideline for ethical considerations in this study. The following ethical principles were upheld at all times: autonomy, confidentiality, beneficence, non-maleficence and justice.

Autonomy

The right to self-determination is based on the principle of respect of individuals and their ability to control their own destiny (Houser, 2012; Polit & Beck, 2008). This follows the notion that all people should be awarded a basic level of human dignity (Smith, 1999). All participants, including patients who refused to take part in the study, were treated with dignity and respect. Participants were made aware of all relevant information before being asked for consent. Specific to Aim 2, a research letter explaining the study was given prior to asking for consent. An option to withdraw from study without repercussions was also given to the participants. Proxy consent was not sought for those with dementia or similar illnesses (Pope & Sellers, 2012).

Confidentiality

This principle was maintained throughout the study. For the retrospective record review all the identifying information was removed when storing the data on the computer. No personal or demographic identifying information was included on the questionnaires. Initially the only foreseeable threat to confidentiality was with regards to the clinic being easily identified after writing up the results of the study but not a threat to the individuals themselves. The facility could therefore come under an unflattering light and if it can be identified due to lack of other facilities this could be a problem. At the moment, the ototoxicity monitoring programme has been decentralised only into the Khayelitsha community. The data collection was however, performed at more than one site, therefore addressing the initial threat to confidentiality. At the provincial level, plans to fully decentralise MDR-TB management service delivery are still being considered (Western Cape Government, 2011). If implemented while the findings of this study have not been released then the threat to confidentiality would also be automatically addressed.

Codes were used to identify participants with the retrospective record review as well as questionnaires administered.

Poor urban populations such as Khayelitsha are commonly cited as being vulnerable groups (Van Ryneveld, Parnell & Muller, 2003). Initially the impact of being a vulnerable group was going to be amplified via self-administering the questionnaire as participants might have felt too intimidated to fill in the questionnaire. Since the questionnaire had to be verbally administered, this threat was addressed. The researcher however, still reassured the participants of their right and decision to withdraw from the study at any point and their treatment would not be affected. The population in which the study was conducted is also arguably over-researched too, because of the unique characteristics they have that are distinctive and particularly interesting for researchers (Denny & Grady, 2007). Minimal risk was posed to the participants since they were required to answer a verbally administered questionnaire. The indirect benefit they got was that the responses they gave would then be used to advocate and improve the service delivery system.

Beneficence

Beneficence involves making an effort to secure the wellbeing of participants (Houser, 2012). It is hoped that the findings of this study will help in improving service delivery for ototoxicity monitoring by eliminating some of the barriers noted. Participants received airtime vouchers at facility 2 as a token of appreciation, after taking part in the study. The airtime was not intended to be used as a method of coercion.

Non-maleficence

Non-maleficence is not doing harm to the participants (Houser, 2012). Care was taken to ensure that the nurses would not know who participated in the study; in order to prevent participants from being victimised if the nursing staff issues were highlighted as a possible reason for non-adherence. An effort was also made to ensure that the participants did not lose their place in the queue for their medication.

Justice

Justice refers to the participants' rights to fair treatment and fairness in distribution of benefit and burden (Houser, 2012). Claims of over-researching are likely to be reported in contexts where repeated engagements do not lead to any experience of change (Clark, 2008). All MDR-TB patients at the facility had an equal chance to take part in this study. The findings of this study will therefore be disseminated to the facilities, provinces and through publications, in order to bring about the change that is needed to improve service delivery in this community, and in so doing fulfil a form of distributive justice. There is a need for researchers in developing countries to fulfil an advocacy role (International Council of Nurses, 2008) as this would indirectly include the obligation to disseminate results, thereby bring about the change that is needed.

Chapter Four: Results

Introduction: Findings of the study will be presented according to its aims and objectives. The first section of the chapter will present the results regarding the pattern of service utilisation based on a retrospective review of patient records. Then the outcomes of an exploratory survey conducted to find out facilitators and barriers to the use of ototoxicity monitoring services for outpatients will be described.

Phase One: Pattern of Service Utilisation

Phase one focused on the pattern of utilisation of available ototoxicity monitoring services using a retrospective patient record review. The influence of the following factors on patterns of utilisation was investigated:

(1) The area from which the patient was referred (proximity).

(2) The MDR-TB treatment regimen prescribed for the patient.

(3) The time from inclusion in MDR-TB programme to first audiologic assessment (waiting period).

(4) The hearing status at the time of the initial hearing test.

(5) Development of hearing loss during the course of treatment and

(6) The presence and/ development of disabling hearing loss.

Patients' Description

A total of 860 patient files were reviewed; 59 were deemed ineligible because there was missing information pertinent to the study such as the treatment regimen, date when MDR-TB treatment was implemented in order to establish the waiting period or demographic information. This left a total of 801 patient files which met the inclusion criteria and therefore were included in this study. A total of 415 (51.8%) males and 386 (48.2%) females participated in the study, with the mean age being 37 [range 7 – 85] years. The variables below were generated for the purpose of data analysis and show the frequency count of each variable (refer to Table 1).

Table 1: Summary of patient description

Variables	**(N=801)**
Referral Area (Proximity)	
City Bowl	13 (1.6%)
Northern Suburbs	167 (20.9%)
Atlantic Seaboard	24 (3%)
Southern Suburbs	43 (5.4%)
South Peninsula	23 (2.9%)
Cape Flats	334 (41.8%)
Helderberg	23 (2.9%)
West Coast	142 (17.8%)
Cape Winelands	27 (3.4%)
Eden	3 (0.4%)
Central Karoo	1 (0.1%)
Treatment Regimen	
Kanamycin	689 (86.1%)
Kanamycin and Streptomycin	15 (1.9%)
Streptomycin	30 (3.8%)
Others	66 (8.2%)
Hearing Status	
Normal hearing (≤25dB HL)	397 (49.6%)
Hearing loss (≥26dB HL)	404 (50.4%)
Development of hearing loss (ASHA criteria)	315 (64.3%)
No development of hearing loss	175 (35.7%)
Disabling hearing loss (WHO criteria)	139 (17.4%)
No disabling hearing loss	661 (82.6%)

Figure 2 shows the time it took patients to attend the initial hearing test and is broken down into four categories. The majority of patients (65.3%) took between one month and three months to have their initial hearing test conducted.

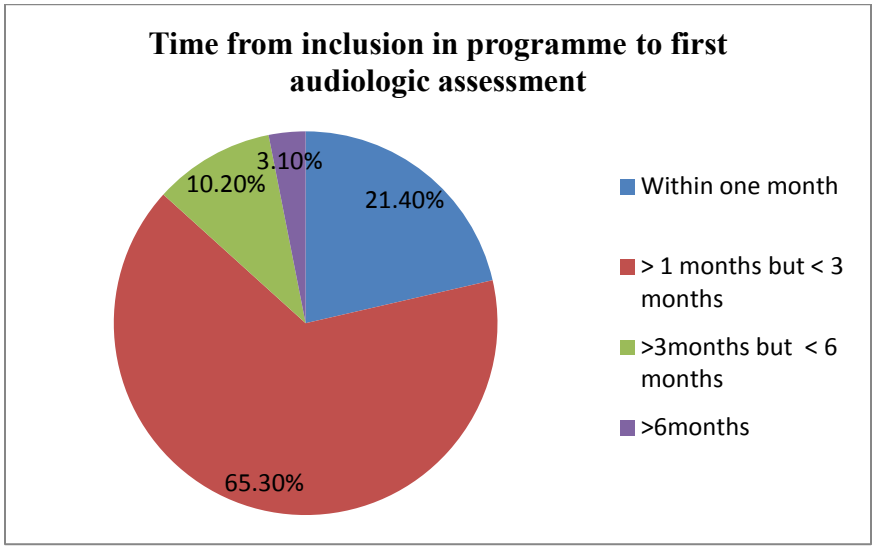


Figure 2: Time from inclusion in the MDR-TB programme to the first audiologic assessment (waiting period).

Pattern of Attendance

Minimal attendance was described as having between 1-3 visits and regular attendance being 4-6 visits. The overall pattern of utilisation showed that a total of 76% patients had minimal attendance for their hearing test appointment (i.e. had between 1-3 visits) and only 24% had attended regularly (i.e. between 4-6 visits) (see Figure 3). Patients who only attended their first appointment and did not return for subsequent appointments were 39.1%. Of those who attended initially, less than ten percent (9.1%) attended their first six appointments – giving an overall attrition rate of 90%.

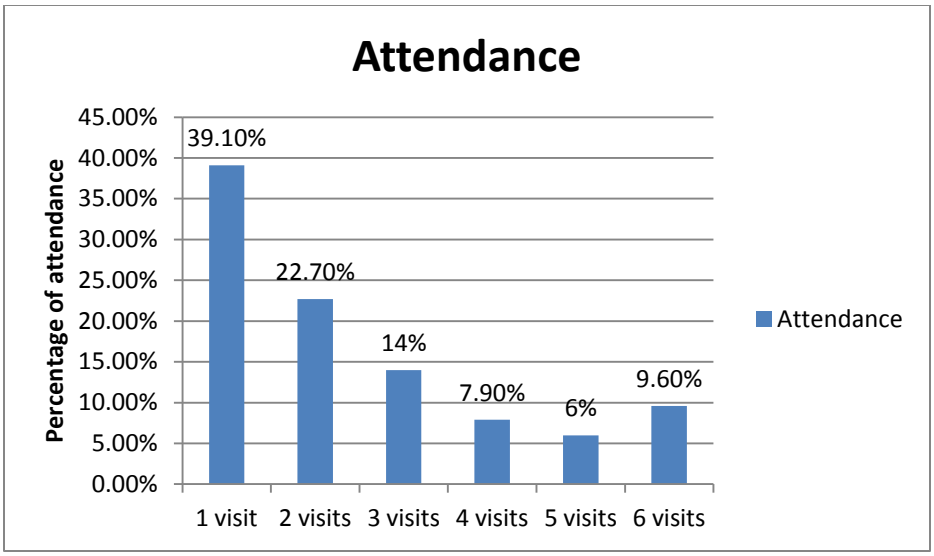


Figure 3: Frequency of attendance

Pattern of Attendance as a Function of Hearing Status

The majority of patients had minimal attendance (i.e. 1-3 visits) and Table 2 shows the number of patients in each hearing status group. For those that utilised the services at least twice, the development of hearing loss was assessed using the ASHA (1994) criteria.

Table 2: Pattern of attendance as a function of hearing status

	n	1-3 visits	4-6 visits
Normal hearing (≤25dBHL)	397	317 (79.9%)	80 (20.1%)
Hearing loss (≥ 26dBHL)	404	293 (72.5%)	111 (27.5%)
Development of hearing loss (ASHA criteria)	315	173 (54.9%)	142 (45.1%)
No development of hearing loss	175	127 (72.6%)	48 (27.4%)
Disabling hearing loss (WHO criteria)	139	78 (56.1%)	61 (43.9%)
Non-Disabling hearing loss	661	531 (80.3%)	130 (19.7%)

Pattern of Attendance as a Function of Referral Area

The following areas would be considered outside the Cape Metropole area therefore requiring a substantial travelling distance to the central TB facility: Helderberg, West Coast, Cape Winelands, Eden and Central Karoo. Table 3 shows the attendance according to the referral areas. The majority of the patients had minimal attendance with the exception of those from the City bowl area, whose majority fell into regular attendance (i.e. between 4-6 visits) suggesting that close proximity to health care services facilitate utilisation.

Table 3: Pattern of attendance as a function of referral area (proximity)

	n	**1-3 visits**	**4-6 visits**
City Bowl	13	4 (30.8%)	9 (69.2%)
Northern Suburbs	167	129 (77.2%)	38 (22.8%)
Atlantic Seaboard	24	18 (75%)	6 (25%)
Southern Suburbs	43	35 (81.4%)	8 (18.6%)
South Peninsula	23	18 (78.3%)	5 (21.7%)
Cape Flats	334	268 (80.2%)	66 (19.8%)
Helderberg	23	21 (91.3%)	2 (8.7%)
West Coast	142	99 (69.7%)	43 (30.3%)
Cape Winelands	27	17 (63%)	10 (37%)
Eden	3	1 (33.3%)	2 (66.7%)
Central Karoo	1	0 (0%)	1 (100%)

Pattern of Attendance as a Function of Treatment Regimen, Waiting Period and Sex

The pattern of attendance was assessed within each treatment regimen category, waiting period and sex. The same pattern of minimal attendance was observed with the majority of the patients in all the categories (see Table 4).

Table 4: Pattern of attendance as a function of treatment regimen, waiting period and sex

		n	1-3 visits	4-6 visits
Treatment Regimen	Kanamycin	689	524 (76%)	165 (24%)
	Kanamycin & streptomycin	15	11 (73.3%)	4 (26.7%)
	Streptomycin	30	26 (86.7%)	4 (13.3%)
	Other	66	48 (72.7%)	18 (27.3%)
Waiting period	Within one month	124	77 (62.1%)	47 (37.9%)
	0-3 months	379	282 (74.4%)	97 (25.6%)
	4-6 months	59	50 (84.8%)	9 (15.2%)
	>6 months	18	14 (77.8%)	4 (22.2%)
Sex	Males	415	320 (77.1%)	95 (22.9%)
	Females	386	290 (75.1%)	96 (24.9%)

Generalised Linear Model: Relative/Risk Ratio

Relative risk estimation by log-binomial regression using generalised linear modelling was used as inferential statistics for analysis. From the results obtained, variables that were statistically significant had a p-value <0.05 and an RR value < 1 for any specific variable indicated less likelihood of attendance of a hearing test appointment when compared to the reference variable. An RR value greater than 1.0 indicated more likelihood of attendance when compared to the reference variable. The following variables were found to influence attendance: proximity (referral area), waiting period, pre-existing hearing loss at initial audiological assessment, development of ototoxic hearing loss and the presence and development of disabling hearing loss (see Table 5).

In terms of referral area (i.e. proximity), it was found that in comparison to the reference referral area (City Bowl), those who lived in the following referral areas: Northern Suburbs, Atlantic Seaboard, Southern Suburbs, South Peninsula, Cape Flats, Helderberg, West Coast and Cape Winelands were less likely to attend the hearing test appointment.

For the waiting period, it was found that when compared to those who attended a hearing test within a month (reference waiting period), patients who took between 1-3 months after being diagnosed with MDR-TB to attend their initial hearing test appointment were 0.3 times (30%) less likely to attend their hearing test appointment. Patients who took between 3-6 months were 0.6 times (60%) less likely to attend. It was generally found that the longer the time taken to attend the first hearing test, the less likely patients were to utilise the services.

Regarding hearing status, compared to those with a hearing loss at baseline (reference category), those with normal hearing were 0.3 times (30%) less likely to attend (RR 0.7, p-value 0.02). Those who had developed hearing loss during the course of treatment were 0.6 times (60%) [RR 1.6, p-value 0.0] more likely to attend when compared with those who did not develop hearing loss (reference category). Patients without disabling hearing loss (reference category), when compared with those who had a disabling hearing loss were 1.2 times (120%) [RR 2.2, p-value 0.0] more likely to attend than those without a disabling hearing loss (reference category). Pre-existing hearing loss, development of a hearing loss as well as disabling hearing loss were therefore motivating factors in influencing attendance.

The following variables were not statistically significant therefore did not influence the utilisation of ototoxicity monitoring services: age, sex and treatment regimen (see Table 5). The variables in bold were statistically significant and influenced attendance.

Table 5: Predictors of regular attendance (i.e. 4-6 visits)

Variable		**N**	**% 4-6 visits**	**P-value**	**RR (95% CI)**
Referral Area (Proximity)	City Bowl	13	69%		1.0 (ref)
	Northern Suburbs	**167**	**23%**	**0.00**	**0.3(0.2-.05)**
	Atlantic Seaboard	**24**	**25%**	**0.01**	**0.3(0.2-0.7)**
	Southern Suburbs	**43**	**18.6%**	**0.00**	**0.2(0.1-0.5)**
	South Peninsula	**23**	**21.7%**	**0.01**	**0.3(0.1-0.7)**
	Cape Flats	**334**	**19.8%**	**0.00**	**0.3(0.2-0.4)**
	Helderberg	**23**	**8.7%**	**0.00**	**0.1(0.02-0.5)**
	West Coast	**142**	**30.3%**	**0.00**	**0.4(0.3-0.6)**
	Cape Winelands	**27**	**37%**	**0.03**	**0.5(0.3-0.9)**
	Eden	3	66.7%	0.9	0.9(0.4-2.1)
	Central Karoo	1	100%		
Treatment Regimen	Kanamycin	689	24%		1.0 (ref)
	Kanamycin & streptomycin	15	26.7%	0.8	1.1(0.5-2.6)
	Streptomycin	30	13%	0.2	0.5(0.2-1.4)
	Other	66	27.3%	0.5	1.1(0.8-1.7)
Waiting period	Within one month	124	37.9%		1.0 (Ref)
	0-3 months	**379**	**25.6%**	**0.007**	**0.7 (0.5 – 0.9)**
	4-6 months	**59**	**15.3%**	**0.005**	**0.4 (0.2 – 0.8)**
	>6 months	18	22.2%	0.2	0.6 (0.2 – 1.4)
Hearing status	Hearing loss (≥26dBHL)	404	27.5%		1.0 (ref)
	Normal hearing (≤25dBHL)	**397**	**20.2%**	**0.02**	**0.7 (0.6 – 0.9)**
Development of hearing loss	No change	175	27.4%		1.0 (ref)
	Change	**315**	**45.1%**	**0.00**	**1.6 (1.3 – 2.2)**
Disabling HL	No	661	19.7%		1.0 (ref)
	Yes	**139**	**43.9%**	**0.00**	**2.2 (1.7 – 2.8)**
Age	7-29	239	23%		1.0 (ref)
	30-39	232	21%	0.5	0.8(0.6-1.2)
	40-49	189	26%	0.5	1.1(0.8-1.6)
	50-71	141	28%	0.2	1.2(0.9-1.7)
Sex	Male	415	22.9%		1.0 (ref)
	Female	386	24.9%	0.6	1 (0.8-1.4)

In conclusion, the following variables were statistically significant in influencing the utilisation of services; referral area (close proximity), presence of pre-existing hearing loss (≥26dB HL) at the initial audiologic assessment, development of hearing loss as well as the presence and/ development of disabling hearing loss. The following variables were however, not statistically significant and therefore did not have any influence with regards to attendance: age, sex, waiting period of over six months and treatment regimen. In addition, a waiting period of more than one month predicted the likelihood of minimal attendance.

Phase Two: Facilitators and Barriers to Service Utilisation

The aim for this phase was to explore factors that are facilitators of and barriers to the use of ototoxicity monitoring services using a survey conducted at two facilities where such services are available, viz., a central TB hospital (Facility 1) and a community clinic setting (Facility 2).

Participant Description

The questionnaire was administered to a total of 74 participants. All participants were MDR-TB patients attending the facilities for outpatient services. Six individuals did not give consent to participate in the study. More details of the characteristics of the participants surveyed at each facility are given in Table 6.

Table 6: Summary of participants' description

	Facility 1 (N = 31)		**Facility 2 (N=43)**	
	n	Percentage	n	Percentage
Gender (female)	15	51%	23	53%
(male)	16	49%	20	47%
Age distribution in years				
18-29.9	12	38%	16	37%
≥30	19	62%	27	63%
Educational status				
Below Grade 12		56%	37	84%
Grade 12 and higher		28%	6	16%
Time on Treatment				
less than 6 months	7	23%	13	30%
6 months to 1 year	12	39%	15	36%
1 to 2 years	11	36%	14	32%
2 to 3 years	1	2%	1	2%

Participants' Questionnaire Results

Question 1 asked participants whether they have ever missed their hearing test appointment since initiation of treatment. Out of all the 74 participants, 11 participants (15%) reported "Yes" thus indicating that they have missed at least one hearing test since treatment initiation.

Possible reasons that may lead to participants missing an appointment were explored in questions 2a-2d. The reasons stated on the questionnaire were mainly logistical issues that were thought to be important for influencing a patient's decision to attend or not attend a hearing test e.g. transport costs, difficulties taking time off work, being sick due to side effects from medications and long queues at the facility. Most participants indicated that logistic issues were not a barrier to the use of ototoxicity

monitoring services (see Figure 4). The majority of participants (98%) were not employed therefore taking time off work was not a barrier for question 2b.

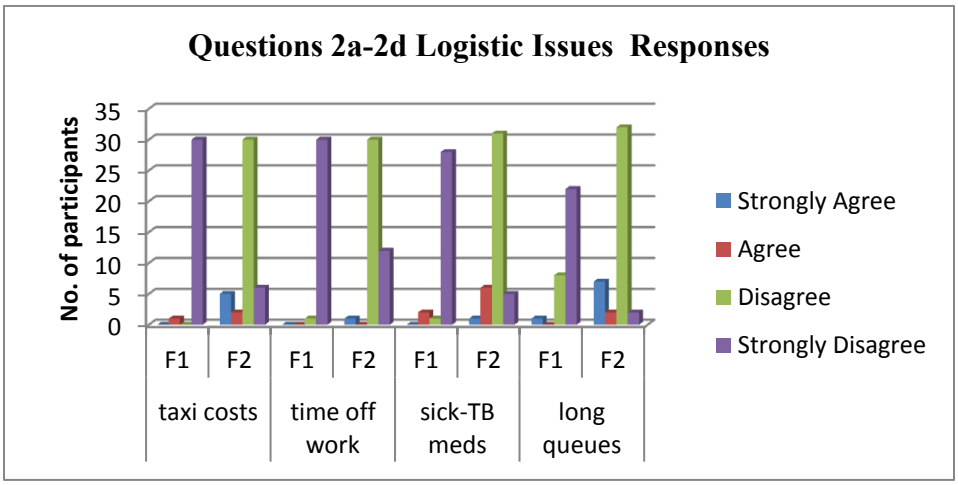


Figure 4: Possible reasons that may lead to missing an appointment at Facility 1 (F1) and Facility 2 (F2)

Question 2e was open-ended and it explored if there was any other reasons one would miss their hearing test appointments. These reasons were noted to be having an appointment clash for co-existing ailments or for grant processing and/ mixing up of dates, being hospitalized or the patient was sick, and last, personal attitude: thinks the hearing is fine so does not need to have their hearing tested. Only one participant highlighted each barrier.

Questions 3-4 dealt with participants' attitude to the use of ototoxicity monitoring services. At Facility 1, a total of 71% of the participants both disagreed and strongly disagreed to the statement that "one only needs to have their hearing tested if they felt deaf" (question 3) (see Figure 5).

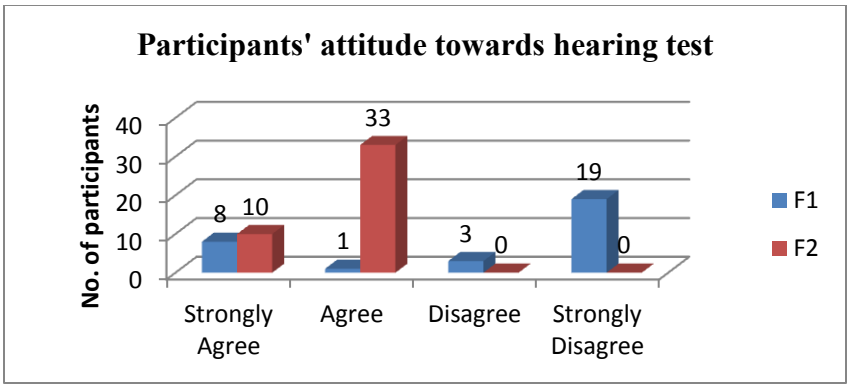


Figure 5: Participants' attitude regarding the need for hearing test

At Facility 2 the participants agreed (both strongly agree and agree) to question 3 that they only need to have their hearing tested if they feel deaf, whereas in question 4 (see Figure 6), they also agreed that having their hearing tested is as important as taking their TB medication. When asked "taking TB medication was as important as having their hearing tested" (question 4), 84% of the participants agreed that taking TB medication was as important as having their hearing tested (see Figure 6).

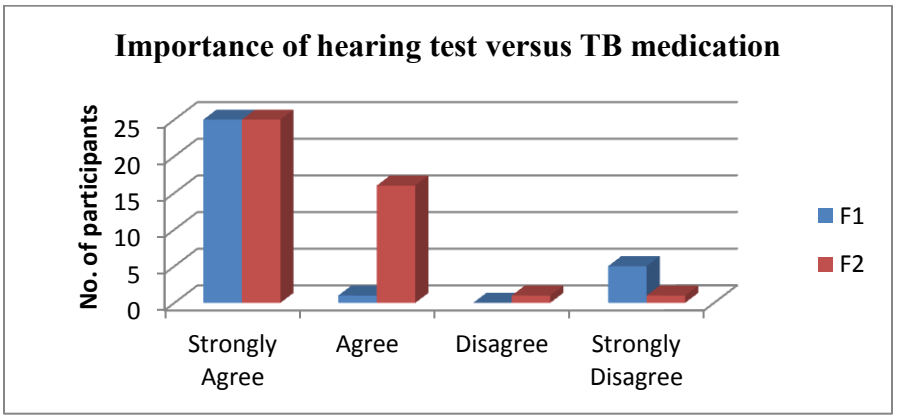


Figure 6: Participants' responses regarding the hearing test being as important as taking TB medication

Questions 5 and 6 dealt with the interaction between nurses and MDR-TB patients. Most of the participants disagreed with the statement that nurses at the facility were rude (see Figure 7 for responses to question 5 (participants' attitude [Q5]).

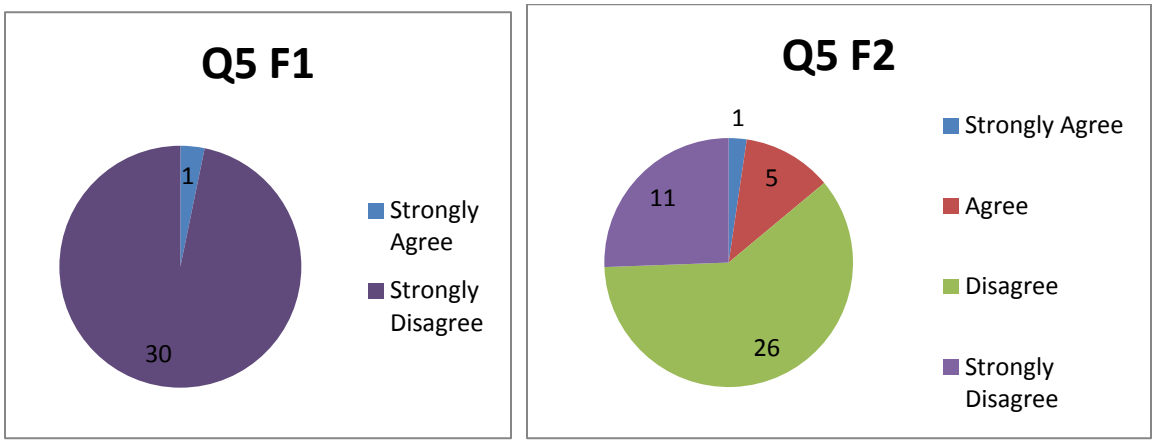


Figure 7: Responses to the nurses being rude at facility 1(F1) and facility 2 (F2)

All of the participants 100% at Facility 1 reported that the nurses are friendly and helpful with 63% of the participants stating the same at Facility 2 for question 6. Participants further reported that even if the nurses are rude, that will not deter them from getting the services they need from the clinic.

Questions 7-9 dealt with beliefs. The highest frequency counts of the responses fell into the 'disagree and strongly disagree' category meaning that the participants were aware that if they acquire a hearing loss it is because of the ototoxic medication. At both facilities, similar responses were obtained where the cause for hearing loss was not ascribed to supernatural causes. Figure 8 shows the responses obtained regarding the participants' beliefs concerning hearing loss.

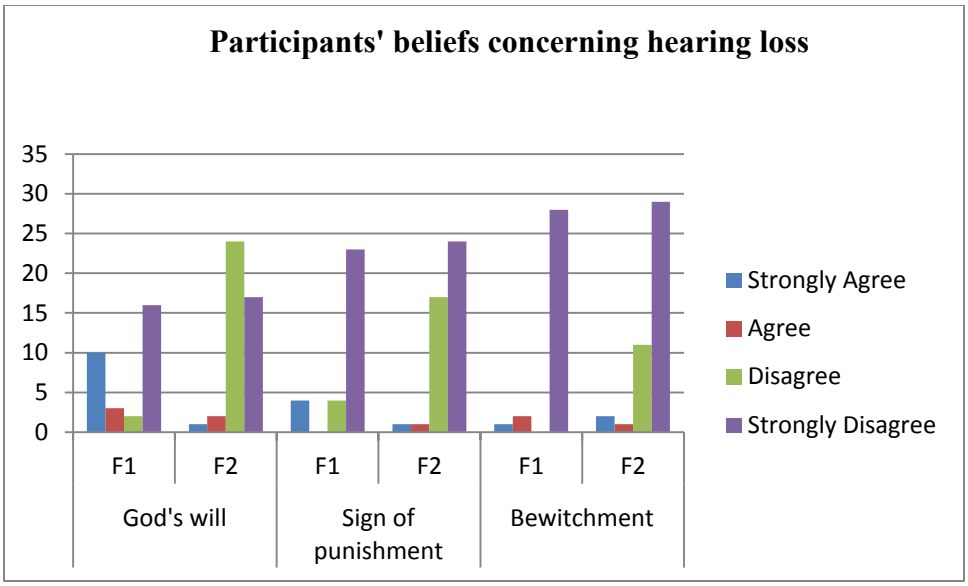


Figure 8: Beliefs concerning hearing loss

Question 10 asked if the participants thought the hearing loss would resolve after finishing the TB treatment. The findings showed that 71% of the participants at Facility 1, and 63% of the participants at Facility 2, thought that the hearing loss is reversible after finishing the TB treatment (see Figure 9).

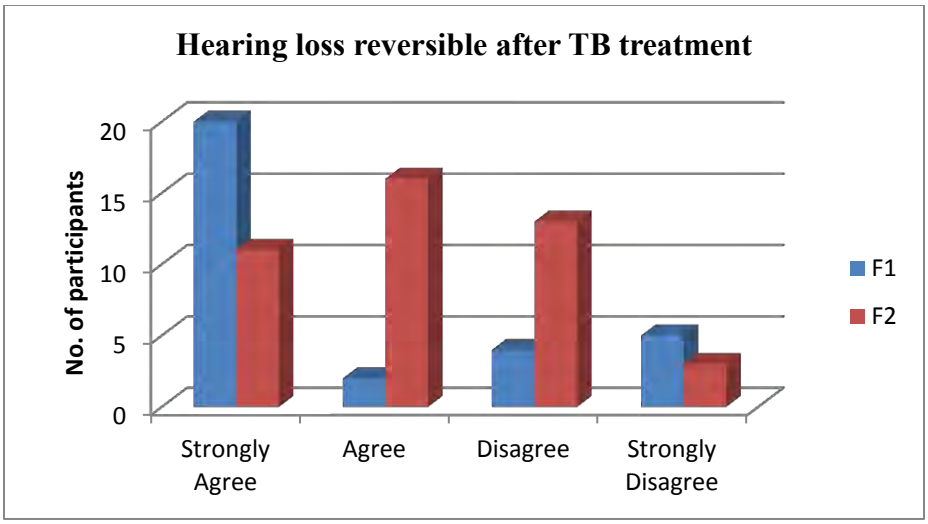


Figure 9: Responses to hearing loss being reversible after TB treatment

Table 7 shows a summary of frequency count obtained for each question with the highest frequency count in bold

Table 7: Frequency count of questionnaire responses (F1 N=31; F2 N=43)

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	F1	**F2**	**F1**	**F2**	**F1**	**F2**	**F1**	**F2**
2a (taxi costs)	0 (0%)	5 (12%)	1 (3%)	2 (5%)	0 (0%)	**30 (70%)**	**30 (97%)**	6 (14%)
2b (time off work)	0 (0%)	1 (2%)	0 (0%)	0 (0%)	1 (3%)	**30 (70%)**	**30 (97%)**	12 (28%)
2c (sick)	0 (0%)	1 (%)	2 (6%)	6 (14%)	1 (3%)	**31 (72%)**	**28 (90%)**	5 (12%)
2d (long queues)	1 (3%)	7 (16%)	0 (0%)	2 (5%)	8 (26%)	**32 (74%)**	**22 (71%)**	2 (5%)
3(hearing test if deaf)	8 (26%)	10 (23%)	1 (3%)	**33 (77%)**	3 (10%)	0 (0%)	**19 (61%)**	0 (0%)
4 (hearing test vs TB medication)	**25 (81%)**	**25 (58%)**	1 (3%)	16 (37%)	0 (0%)	1 (2%)	5 (16%)	1 (2%)
5 (nurses rude)	1 (3%)	1 (2%)	0 (0%)	5 (12%)	0 (0%)	**26 (60%)**	**30 (97%)**	11 (26%)
6 (nurses helpful)	**31 (100%)**	13 (30%)	0 (0%)	**21 (49%)**	0 (0%)	7 (16%)	0 (0%)	2 (5%)
7 (God's will for hearing loss)	10 (32%)	1 (2%)	3 (10%)	1 (2%)	2 (6%)	**24 (56%)**	**16 (52%)**	17 (40%)
8 (HL sign of punishment)	4 (13%)	1 (2%)	0 (0%)	1 (2%)	4 (13%)	17 (40%)	**23 (74%)**	**24 (56%)**
9 (HL due to bewitchment)	1 (3%)	2 (5%)	2 (6%)	1 (2%)	0 (0%)	11 (26%)	**28 (90%)**	**29 (67%)**
10 (hearing loss reversible)	**20 (65%)**	11 (26%)	2 (6%)	**16 (37%)**	4 (13%)	13 (30%)	5 (16%)	3 (7%)

Gender-Based Differences in Service Utilisation for Questions 2-10

Due to a small sample size and relatively homogeneous study sample, gender differences in utilisation patterns was the only variable that was investigated. The difference between males and females' responses to question 1 which asked the participants if they had missed a hearing test appointment before, was analysed using Fisher's exact test. A $p<0.05$ was considered significant. The results showed that there was no significant difference in appointment attendance between males and females ($p=0.394$ and $p=0.544$) for facility 1 and 2 respectively.

The Mann-Whitney U test was used in order to determine if there is any difference between males and females in the utilisation of the ototoxicity monitoring services for questions 2-10. A $p <0.05$ was considered statistically significant. For all the questions at both facilities, a p-value greater than 0.05 was obtained meaning there was no significant difference between gender in the utilisation of the ototoxicity monitoring services. Overall service utilisation was similar between males and females.

In summary, the results of phase two showed that overall, facilitators for utilisation of services were as follows: close proximity to the health facility, good interaction with the TB nurses and understanding the importance of monitoring the hearing due to the ototoxic effects of TB medication.

Barriers reported by the participants included: appointment clash for co-existing ailments or for grant processing and/ mixing up of dates, being hospitalized or the patient was sick and personal attitude: thinks the hearing is fine so does not need to have their hearing tested.

Chapter Five: Discussion

Introduction: This chapter will present a discussion of the findings of the study in relation to existing research literature. Study recommendations and implications for future research will then be explored.

The findings of this study showed that the majority of participants under-utilised available services for ototoxicity monitoring when accessed on an outpatient basis. Specific to phase one, the overall pattern of utilisation showed that a total of 76% patients had minimal attendance for their hearing test appointment (i.e. had between 1-3 visits) and only 24% had attended regularly (i.e. between 4-6 visits). The study also found that about 39% of patients attended only the initial hearing test appointment. The pattern therefore shows that of those who enter the ototoxicity monitoring programme, roughly three quarters of them dropped out within the first three visits. The ototoxicity monitoring programme being offered is therefore only effective and reaching its potential for one in four participants. The reality could be even worse since it is not known how many patients were referred and did not attend the initial hearing test appointment.

Only about 10% of the patients attended all of the first six hearing test appointments. Six visits is the minimum number of visits expected for any patient being treated with long-term ototoxic injectable aminoglycoside (especially kanamycin) for MDR-TB (Duggal & Sarkar, 2007; TB Alliance, 2015) in order to monitor the hearing. An ideal scenario however would be to continue to monitor hearing throughout the treatment course and then for up to six months thereafter due to the propensity for ototoxic hearing loss to continue to progress even once the drug has been withdrawn (Duggal & Sarkar, 2007).

Given that patients who were receiving MDR-TB treatment were enrolled in the DOTS strategy for TB treatment, it was expected that most of these patients would use available services including ototoxicity monitoring, particularly once such services had been devolved to local community-based facilities. DOTS strategy has been reported to improve the likelihood for adherence to treatment recommendations (Western Cape Government, 2014; MSF, 2011), however, it was found that patients in this study did not

utilise ototoxicity monitoring services. Previous reports have raised concerns that while the DOTs programme has been widely implemented, too often the emphasis has been on simply observing patients taking medication, and not enough on true support which is required to care for people with serious, chronic and life-threatening diseases (Achmat & Roberts, 2006). Patients need to be empowered especially those who have come from a patriarchal system of medicine and who are likely from a different linguistic, cultural and socio-economic status from the person providing care (Achmat & Roberts, 2006).

While the results suggest that patients do not sustain their attendance and use of ototoxicity services, it remains unknown how many patients fail to enter the audiologic system at all. If patients do not attend the initial hearing test, any pre-existing hearing loss will be missed; thereby increasing the risk for developing ototoxic deterioration of hearing (Duggal & Sarkar, 2007; ASHA, 1994) as well as depriving the treating health care practitioner of this important information. If the initial appointment is missed, patients may not know how to access services should a hearing loss develop, therefore leaving disability unaddressed. There are a number of factors which may impact adherence, of which patient-related factors are just one determinant. WHO (2014) suggested that the common belief that patients are solely responsible for adherence/service utilisation is to be dispelled. WHO (2014) highlighted five interactive dimensions that affect adherence in healthcare service utilisation and all these five areas require in depth exploration to reveal possible reasons for under-utilisation of ototoxicity monitoring services. As explored in the literature review, the five dimensions are: social/economic-related factors, health care team and system-related factors, condition-related, therapy-related and patient related factors. The next section of this discussion will discuss these dimensions and how they influence ototoxicity monitoring service utilisation.

Several factors were found to be significant in influencing patients' patterns of utilisation of ototoxicity monitoring services. These involved health care system-related factors: proximity to the health facility, a shorter waiting period between treatment initiation for MDR-TB and the first audiologic assessment, good interaction with the TB nurses and understanding the importance of monitoring. Patient-related factors included:

patients being hospitalised, appointment clashes and a personal attitude where a patient thinks their hearing is fine therefore does not need to make use of ototoxicity monitoring. Condition-related factors were also noted such as hearing status at the time of treatment initiation, development of ototoxic hearing loss during treatment and disabling hearing loss.

Health care system and team-related factors

Logistics. Close proximity facilitates utilisation of healthcare services, while conversely distance may act as a barrier when services are remote from where the individuals reside (Nteta et al., 2010). Evidence from this study revealed that greater travelling distance brought a 90% chance likelihood of non-use of ototoxicity monitoring services which supports the documented report by Nteta et al. (2010). A noticeable difference in the pattern of utilisation was expected with referral areas that were closer to the central TB hospital (i.e. Northern Suburbs) showing markedly better adherence than those who were referred from further areas outside the Cape Metropole such as Cape Winelands. The lack of a noticeable difference for patients referred to Facility 1 could therefore be because of the lack of motivation or awareness specific to ototoxicity monitoring services considering that close proximity is a facilitator of service utilisation with other health related issues.

Specific to phase two, hospitalisation and appointment clashes were noted on individual basis as barriers. Appointment reminders can be of help to such individuals and an alternative dates can be set in case of a patient being hospitalised. In addition, an open door policy can also be incorporated where patients can come to the clinic any day, with or without an appointment since the patients are expected to come daily for DOTS. Patients with life threatening diseases, such as, children with HIV, have a no ‘wrong day’ policy which has been found to be effective in treating the disease (Helping our Women, 2015).

Other logistic issues such as cost of transportation, taking time off work, being sick and waiting in long queues were thought to have the potential to influence the uptake of ototoxicity monitoring services. Contrary to the expectations from the literature review, this was however not borne out by the results. Certain authors suggested the

above logistic factors as barriers in service utilisation (Freitas et al., 2012; Nteta et al., 2010). Participants in this study however, revealed that these logistic factors did not affect them as the health care services were within close proximity. Some participants from facility 1 who resided outside the Cape Metropole were provided with transport in order to attend their ototoxicity monitoring service appointments. In addition, most of the participants were unemployed therefore taking time off work was inapplicable. For those who were employed, they were issued with a sick leave certificate which was effective for the duration of the treatment. Hess (2009) suggested that there is a need to develop unorthodox service provision locations as well as the provision of appointment times that are suitable to the workers' needs. He further stated that interventions such as reducing wait times, providing meaningful incentives and the renovation of disease specific educational approaches may improve outcomes.

Waiting period. Delays in the waiting period in accessing services implied that the longer the time taken to attend the first hearing test, the less likely patients were to utilise the ototoxicity monitoring services. Establishment of hearing thresholds within the recommended 72 hours of drug administration (WHO, 2010) serves two purposes. First, to define any pre-existing hearing loss which is a risk factor to further deterioration as a result of aminoglycoside exposure; and second, to establish a baseline which enables comparison with subsequent tests to evaluate if ototoxicity has occurred (Durrant et al., 2009). Important information may be unavailable to health care practitioners who are providing the treatment if the time period of one month is exceeded (Duggal & Sarkar, 2007; ASHA, 1994). It is also more feasible, in a hospital or centralised setting, to monitor inpatients and ensure the initial hearing test is conducted within the stipulated timeframe but it is not as practical to monitor outpatients (Department of Health, 2011; MSF, 2011). When compared with the reference category of attendance within one month, (ASHA, 1994; WHO, 2010); attendance was found to be 30% less likely for patients who took between one to three months to attend. Those who took between three and six months to attend had a 60% less chance of doing so.

The reasons for better adherence among patients who utilised the ototoxicity monitoring services promptly could be that individuals had already noted a hearing loss

which is associated with self-perceived limitations; social pressure or support exerted by significant others, or willingness to engage with rehabilitation services (Duijvestijn et al., 2003; Meyer & Hickson, 2012). It is also possible that participants who delayed accessing audiologic services may not have developed hearing loss or been aware of having a hearing loss and thus not valued the importance of monitoring; rather they elected to wait until they became aware of symptoms. It is however possible, that a high frequency hearing loss typical of the initial stages of ototoxicity (Valete-Rosalino & Rozenfeld, 2005) may not have been disabling to patients. It is described in the literature (Fallabi-Stubi et al., 1998) that patients seek assistance when symptoms become problematic for them. It is therefore possible that a discrete high frequency hearing loss or even the onset of tinnitus may not push patients facing life-threatening illness across the threshold towards consultation specific to otological symptoms. However, in this study, high frequency audiometry was not conducted. Another possible reason could however lie in the way the system is structured i.e. one actually has to enter the system first in order to utilise it by getting subsequent appointments. Those who would have faltered would therefore not know how to re-enter the system.

The structure of the healthcare system e.g. referral system, might therefore also be a possible reason for the delay in the initial utilisation of ototoxicity monitoring services. Nkosi et al. (2013) in their study of factors influencing referral of MDR and XDR-TB patients showed that a considerable number of patients got deceased in the interval between diagnosis and referral. This highlights the importance of a stringent follow up, timely and effective referral system for this extremely vulnerable patient group. At Facility 1, one had to enter into the system in order to subsequent audiologic appointments. Therefore if an individual misses the first appointment he/she is effectively exited from the system. Nkosi et al. (2013) gave a possible explanation for referral problems occurring on staff level stating that there may be a considerable level of staff rotating through rather than ‘TB staff’ being permanently in their positions; to what extent this is a contributing factor would remain to be elucidated. Furthermore, there are high levels of attrition in nursing in this country leaving many unfilled posts (Nkosi et al., 2013). The lack of permanent ‘TB staff’ could therefore be another possible reason for lack of follow up on patients as seen with 39% of the patients attending only their first

audiologic assessment, but this assumption cannot be drawn from this study. Dedicated staff would therefore need to track attendance and get patients back into the system if they fall out. Since the audiologists are the ones responsible for managing the ototoxicity monitoring programme, support of non-attenders by the new Audiologists appointed in the TB programme in the Western Cape will then be a crucial role. Effective and accurate flow of information between the central TB hospital and the clinics from which patients are referred, which incorporate the DOTS strategy, is thus paramount in ensuring effective uptake of services in a timely manner.

Support networks. Prior to this study it was thought that the attitude of health care professionals with whom the participants had encounters could either facilitate or obstruct adherence to ototoxicity monitoring. Nurse abuse of patients in South Africa has been described by Kruger and Schoombee (2010) as mentioned in the literature review. Other reports have raised concern about patients' human rights being abused in South African hospitals (Vivian et al., 2011). Reports from Govender and Mash (2009) and van der Walt (2004) pertaining to the attitude of nurses towards TB patients revealed that similarities between nurses and the patients, in terms of race, income or educational background, led to fears about the nurses' professional identities. Such concerns about the nurses' role hampered their capacity to relate warmly and empathically with patients (van der Walt, 2004). Hess (2009) however, stated that treatment strategies that incorporate the cultural beliefs and practices of the population may narrow the service gap considerably (Hess, 2009). In contrast, the finding from the current study revealed little concern about the nurses' attitude with respondents perceiving the nurses as helpful and friendly. Furthermore, patients indicated that their desire to ensure their wellbeing would not deter them should they face rudeness from nursing staff. Thus, these findings are positive and in contrast with reports in the literature that reflect badly on nurses dealing with TB patients in particular (Govender & Mash, 2009; van der Walt, 2004). In addition, the experiences reported by patients are encouraging as support in treatment is part of the DOTS philosophy. It is noted that Facility 2 runs support groups to provide awareness, empowerment and care to the users of the facility which might have provided a platform for a positive impact to these individuals to utilising the services provided.

Patient-Related Factors

Attitudes and beliefs. The attitude of an individual compounded with a lack of symptoms was noted in the literature as variables influencing service utilisation, as outlooks and beliefs greatly shape an individual's behaviour (Levy et al., 2008). The healthcare system has given priority to treating MDR-TB in terms of public health issues such as preserving life and disease control over monitoring the hearing which is an individual and quality of life issue (Harris, Peer, et al., 2012). Participants in phase two, specifically from Facility 2 had the same attitude giving priority to treatment thereby acting as a barrier to service utilisation. Despite Facility 2 participants having support groups and counselling services in place, they however, responded that they should have their hearing tested only if they felt deaf. This attitude could be due to the lack of symptoms in that the effects of hearing loss are not usually immediately apparent. Patients thus cannot appreciate the perceptible benefit of monitoring their hearing and are less likely to adhere to the programme despite the recommendations made during counselling (Moore, 2012). Shaikh and Hatcher (2004) concurred by noting that the type of symptoms experienced for the illness are major determinants of health seeking behaviour thereby implying that the less severe the condition seems to be, the less likely to utilise healthcare services.

Second, beliefs in the supernatural or traditional healers and resignation towards hearing loss management were expected to influence utilisation in this study (Shelton et al., 2011). From the participants' responses, a high awareness of the ototoxic effects of their medication was revealed by most participants therefore the influence of the supernatural as a cause of hearing loss in this study was not endorsed. Resignation towards hearing loss management also did not influence service utilisation as seen with better adherence of those with a hearing loss.

However, despite the high awareness and apparent understanding of ototoxic effects of MDR-TB medication, a large majority (71% Facility 1, 63% Facility 2) of the participants indicated their belief that the hearing loss will be reversible after completing their TB treatment. It is possible that the permanency and possible progression of the hearing loss as a result of treatment might be an aspect that is not stressed in patients'

awareness education and the focus is more on the cause and monitoring. Another reason could be that the information is given, but the participants do not retain the information or they are optimistic and think that the effects will be reversible. Schmidt von Wühlisch and Pascoe (2010) stated that patients in the health care sector frequently struggle to understand and remember details of clinical information and the reasons underlying their treatment. Realising from the onset that the hearing loss is permanent and possibly progressive will help in the patient being more open to rehabilitation options.

The awareness of an irreversible hearing loss might however lead patients refusing to take the aminoglycosides thereby needing the much more expensive drugs thus adding onto the already costly MDR-TB treatment. Additional costs to treatment will have massive implications for developing countries. As an ethical issue, patients should be made aware of the need to treat TB due to its pandemic nature and it being a threat in terms of public health; but also fair and open discussion regarding the possibility of hearing loss should precede the patients' informed consent. Finally there is a duty of care towards those who require audiologic rehabilitation to ensure this is high quality and able to return the patient to his or her pre-morbid lifestyle.

Age. Age as a patient-related factor is reported to affect adherence, but inconsistently (WHO, 2014). Age was therefore expected to influence the pattern of utilisation. Findings from this study pertaining to age were not statistically significant but a trend was however observed. A clear trend emerged in phase one, with the patients in the age category of 40 years and above, being more likely to attend. Patients aged 39 years and younger were less likely to utilise the ototoxicity monitoring services. Reasons for this could be in line with the report made by WHO (2014) where older adults and the elderly are more likely to adhere to treatment because it is essential to their well-being (depending on the type of treatment) and is thus a critically important component of care. In addition the young adults' poor adherence has been thought to be a reflection of rebellion against the regimen's control over their lives (WHO, 2014). It may be that marketing ototoxicity monitoring packages has to be different from the way they are currently presented. Thus, different aspects of the advantages and importance of preserving hearing have to be highlighted, for example, having influential figures who

have had TB encouraging fulfilment of all aspects of the programme. It is also possible that older adults, particularly from those who are arguably from disadvantaged backgrounds, may have previously experienced a more patriarchal health care system and thus follow instructions given by medical staff as they feel disempowered to do anything else (Achmat & Roberts, 2006).

Vaidya et al. (2012) stated that there is a difference regarding health care service utilisation between males and females with a higher uptake in women. The results from the current study in both phases however, do not uphold this finding. For instance, from phase one, the total number of females differed with males by a minimal margin. Statistical analysis also showed no significant difference in the pattern of utilisation of the services. Specific to phase two, all the questions obtained a p-value >0.05 between sexes meaning the difference was not statistically significant at both the sites where the study was performed. In addition, a difference in how males and females responded to each question was expected but again, no statistically significant difference was obtained. Assumptions for these findings were not congruent with Vaidya et al.'s statement and this could be because the sample size was small therefore the discrepancy from what literature suggests. Another possible reason could also be due to the fact that for some types of health care services, women have higher utilisation rates than men (Gerritsen & Devillé, 2009). Ototoxicity monitoring therefore could be one of those types of services where there is no significant difference in service utilisation between genders.

Condition Related Factors

A significant patient-related factor that was found to influence patients' patterns of utilisation of services in phase one, was the patients' hearing status. Patients with hearing loss of ≥26dBHL at baseline, patients who developed hearing loss and those with disabling hearing loss were found to be more likely to use ototoxicity monitoring services. It is therefore possible that the medical staff made patients aware of the ototoxicity monitoring service and patients who noticed a change in their hearing status may have informed the medical staff, which prompted recommendations for ototoxicity monitoring. Furthermore, once medical staff and audiologists established that a patient is at a higher risk of hearing loss from ototoxic medication or their hearing is negatively

being affected by treatment, these patients were likely to be followed up more closely hence their high likelihood of returning for monitoring visits.

It is also possible that patients who perceived their hearing to be negatively affected by the medications were more likely to seek help to prevent further deterioration of hearing. According to Meyer and Hickson (2012), the patient's self-perception of hearing loss, in particular when it is at disabling levels, is likely to motivate him/her to seek help. Garstecki and Erler (1998), agreed with the previous studies mentioned by stating that individuals who had greater hearing loss adhered to services; thus supporting the notion that hearing loss, particularly when marked, is a motivating factor for adherence. Therefore the attendance could have been influenced by help-seeking behaviour in order pursue management options, and not simply to document the loss through monitoring. Individuals with normal hearing however, were less likely to attend their hearing test appointment.

In summary, there are likely more barriers for outpatients than inpatients which need to be explored beyond the scope of this study bearing in mind that considerable expenses have been incurred with the roll-out of such services and there could be cost-effectiveness implications. Investments were made through purchasing equipment and providing training at both facilities. Despite the services being available five days a week, under-utilisation of ototoxicity monitoring services is apparent. The political will to achieve the effective management of TB in the community is evident with the rollout of new and decentralised services and needs to be capitalised upon in order to prove its effectiveness. In so doing, evidence is given to support the decentralised programme to be replicated and expanded on. Despite close proximity shown to make a difference in service utilisation, one has to bear in mind that there is more to it than just living close by.

Study Limitations

A limitation from phase one was based on the study design itself, in that information used for the review was recorded in the medical files for reasons other than the study, therefore, the reasons for under-utilisation could not be ascertained from the records. The pattern of utilisation was only described for Facility 1, access to Facility 2 was not granted for the retrospective record review. In phase two, the patients who did not utilise the services at the clinic were not included in the survey yet they are the most ideal candidates to shed light on the actual barriers stopping them from utilising the services. The barriers noted were by those who have made use of the ototoxicity monitoring services previously. This was therefore a great limitation and could be rectified by going into the homes of patients who are on MDR-TB treatment but do not make use of the ototoxicity monitoring services and ascertaining their reasons or barriers. Community health workers who already assist patients in the form of the DOTS strategy can be equipped to explore the barriers during their interactions with the patients.

With regards to data analysis of the first aim, a standard pure tone average was used instead of high frequency PTA of 4, 6 and 8kHz which considers the configuration of the hearing loss was not included. This leaves out critical information since it is known that the higher frequencies are affected first by ototoxic medication.

Another limitation was the small sample size used when administering the questionnaire in the second phase of the study. Inferential statistics could not be used in order to generalise the results to the population thereby providing an insight into service delivery improvement. In addition, changing the method of delivery of the questionnaire from being self-administered to being verbally administered was another limitation. The change meant that, the process of administering the questionnaire would be slower as each participant had to wait for their turn whereas self-administering meant more participants could fill in the questionnaire simultaneously thereby allowing more participants to be assessed at the same time. An increase in the Hawthorne effect was also more likely as a need by participants to give socially desirable answers (Polit and Beck, 2008) or a cultural need to be polite and answer in the affirmative (Polit & Beck, 2008). Whereas, if the questionnaire was self-administered, participants' chances of being

identified are less and so they can be more forthcoming. The final limitation was that the sample was not truly representative of the population since the majority of participants denied having missed an appointment making the results skewed by attendees rather than those with more sporadic attendance.

Study Implications

The major implication of this research suggests that policy guidelines should be put in place to ensure the efficiency and effectiveness of ototoxicity monitoring service delivery due to the under-utilisation of services. These guidelines would help to ensure that if similar services are implemented in future, the effect of barriers to the utilisation of current services will be minimized. In addition, the cost implications of having services that are under-utilised make it a very expensive service with a very poor yield. The implications will be discussed using the WHO framework below:

Healthcare team and system-related factors. Some major barriers reported by WHO (2014) which are inextricably linked to health system and team factors are:

- Lack of awareness and knowledge about adherence.
- Sub-optimal communication between patients and health professionals. However in this study, a good interaction between the nurses and TB patients was found.

More emphasis during counselling therefore needs to be given to the irreversible effects of hearing loss due ototoxic medication or possibility of acquiring hearing loss post-treatment, thus the need for continual monitoring. Although adherence interventions directed towards patients have typically focused on providing education to increase knowledge; available evidence shows that knowledge alone is not enough to influence adherence (Roter et al., 1998, as cited in WHO, 2014). Evidence from the current study suggests that understanding of the ramifications of ototoxicity is incomplete. This gap in comprehension, and the belief that the hearing loss is reversible, may have impacted negatively on the uptake of ototoxicity monitoring services.

Flexibility in availing ototoxicity monitoring services at all times is recommended so that who do not keep the first appointment are not effectively exited from the system. The first six appointments can be written on a card and given to a patient upon diagnosis, that

way if s/he misses the initial appointment, there are subsequent dates provided which can be attended with the patient sure to be seen. In conjunction, prompts such as routine reminders for patients to keep pre-arranged appointments via SMS or sending letters can also be incorporated as an attempt to improve ototoxicity monitoring services. Community-based rehabilitation workers can also be made aware of patients in their districts and include them on their rounds to encourage compliance.

Effective flow of communication along the referral pathway needs to be emphasized to ensure the right information is being provided to the patients as well as adequate follow up being implemented. This might imply having someone in charge of a central database which will make it easier to identify patients who do not utilise the ototoxicity monitoring services after being diagnosed and ensure continual monitoring even if a patient relocates. While the actual monitoring and screening services can and arguably should (Duggal & Sarkar, 2007) be devolved to ancillary personnel, the overall management is the responsibility of the audiologist. Newly appointed audiologists in the employ of TB services in the Western Cape should be at the forefront in ensuring that the proposed guidelines for managing TB patients on aminoglycosides are implemented. The audiologist should spearhead patient management and ensure that patients who develop hearing loss receive the appropriate intervention and rehabilitation. However, while a national policy for MDR TB exists (Department of Health, 2011) the guidelines for the province have not yet been finalised.

Social/economic related factors. The main economic and social concerns that should be addressed in relation to adherence are poverty, illiteracy, provision of effective social support networks and mechanisms for the delivery of health services that are sensitive to cultural beliefs about illness and treatment (WHO, 2014). Social support networks are already being provided using the DOTS strategy. MSF has however reported having success with the DOTS strategy (MSF, 2011). Therefore, assessment of social needs, providing social support, providing transport to treatment setting, peer assistance as well as incentives and reimbursements (money or in kind) to reimburse the expenses of attending the appointments, or to improve the attractiveness of the uptake of services can be implemented. Peer assistance will employ people from the same social group helping

someone with tuberculosis to return to the health centre by prompting or accompanying him or her.

Patient-related factors. The major barriers to adherence described in the literature reviewed for the WHO 2014 report included difficulty with motivation and self-efficacy. Motivation, which drives sustainable good adherence, is however, one of the most difficult elements for the health care system to provide in the long term (WHO, 2014). Although health professionals have an important role in promoting optimism, providing enthusiasm, and encouraging maintenance of health behaviours among their patients, the health systems and health care teams experience difficulties in constantly motivating patients with chronic conditions (WHO, 2014). A therapeutic relationship with the patient is therefore encouraged as an attempt to provide motivation, coupled with incentives and/or reinforcements as well as home visits for patients who do not utilise the ototoxicity monitoring services (WHO, 2014; TB Alliance, 2015).

Recommendations

Future Research

Use of a qualitative design such as interviewing the patients who do not utilise the ototoxicity monitoring services as well as a longitudinal study, may reveal additional barriers not previously considered. The level of education can also be included to ascertain if it influences service utilisation. A larger sample size is also recommended so that the findings can be more generalisable as well as considering high frequency average when classifying ototoxic hearing loss.

The pattern of service utilisation at Facility 2 can also be analysed in order to ascertain if the ototoxicity monitoring service is effective. In so doing, the variables that are predictors for attendance can also be noted and this information will be used in improving the service delivery to the patients.

Policy and Practice Recommendations

From the findings of both phases of this study, the following practices are encouraged in order to continue facilitating service utilisation for ototoxicity monitoring: bringing services closer to the community, increasing awareness regarding the effects of ototoxicity medication, ensuring that patients have their first audiologic assessment within a month of inclusion in the MDR-TB programme, understanding the importance of monitoring the hearing as well as the maintaining the apparent good relationships between nurses and MDR-TB patients. With regards to practice, use of high frequency audiometry is recommended during monitoring for early identification of ototoxicity and should be used as a standard.

Conclusion

This study showed that ototoxicity monitoring services that are provided on an outpatient basis are currently being under-utilised. Individuals at risk for developing ototoxic hearing loss, and there are local reports to suggest this occurs in high numbers, likely do not enter or are lost in the system due to lack of follow up. Individuals monitoring these patients must ensure that patients are identified as early as possible when they initiate treatment for MDR-TB treatment to avoid losing them. Research is needed to further elucidate other factors that may act as barriers against the maximal utilisation of the services. The barriers explored should not only be patient-related but the five interactive dimensions identified by WHO (2014) that affect adherence should be considered in order to accurately identify the barriers and address them.

References

Achmat, Z., & Roberts, R. A. (2006, November 21). Steering the storm: TB and HIV in South Africa. A policy paper of the Treatment Action Campaign. *NAM HATip*. Retrieved from http://www.tac.org.za/Documents/TBPaper for Conference1.pdf

American Speech-Language-Hearing Association. (1994). Guidelines for the audiologic management of individuals receiving cochleotoxic drug therapy. *ASHA, 36* (Suppl. 12),11-19.

American Speech-Language-Hearing Association. (2014). *Degree of hearing loss*. Retrieved from http://www.asha.org/public/hearing/Degree-of-Hearing-Loss/

Andrews, J., Shah, N.S., Gandhi, N., Moll, A., & Friedland, G. (2007). Multidrug-resistant and extensively drug-resistant tuberculosis: Implications for the HIV epidemic and antiretroviral therapy roll-out in South Africa. *Journal of Infectious Diseases, 196*, S482-90. doi: 10.1086/521121

Badarudeen, S., & Sabharwal, S. (2010). Assessing readability of patient education materials: Current role in orthopaedics. *Clinical Orthopaedics and Related Research, 468,* 2572–2580. doi: 10.1007/s11999-010-1380-y

Bright, K. (2009). *Guidelines for writing effective market research survey questions*. Retrieved from http://www.researchincorporated.com/writing-effective-survey-questions

Brust, J. C. M., Shah, N. S., Mthiyane, T., Petersen, L., Ning, Y., Allana, S., … Gandhi, N. R. (2014). Novel grading scheme to determine severity of hearing loss in patients treated for MDR-TB. *American Journal of Respiratory and Critical Care Medicine, 189*;A2562. Retrieved from http:// www.atsjournals.org

Burns, N., & Grove, S. K. (2001). *The practice of nursing research: Conduct, critique and utilization.* Philadelphia, PA: WB Saunders Company.

Chigona, W., Van Belle, J., Moore, J., Paddock, S., & Pitout, C. (2005). Usability factors affecting the adoption of ICT-Assisted basic adult-education. *Proceedings of the 8th IFP World Conference on computers in Education WCCE 2005, 2005* (To appear). Retrieved from http://www.comt1.uct.ac.za/InformationSystems/staff/personalpages/jvbelle/2009/CHISA05%20Adoption%20Adult%20Education.pdf

Churchyard, G. J., Mametja, L. D., Mvusi, L., Ndjeka, N., Hesseling, A. C., Reid, A., … Pillay, Y. (2014). Tuberculosis control in South Africa: Successes, challenges and recommendations. *South African Medical Journal, 104*(3 Suppl. 1), 244-248. doi:10.7196/SAMJ.7689

City of Cape Town. (2005). *A population profile of Khayelitsha*. Retrieved from http://www.capetown.gov.za/en/stats/CityReports/Documents/Population%20Profiles/A_Population_Profile_of_Khayelitsha_1052006142120_359.pdf

City of Cape Town. (2011). *Census suburb Khayelitsha*. Retrieved from http://www.capetown.gov.za/en/stats/2011CensusSuburbs/2011_Census_CT_Suburb_Khayelitsha_Profile.pdf

Clark, T. (2008). We're over-researched here: Exploring accounts of research fatigue within qualitative research engagements. *Sociology*, *42,* 953-97. doi: 10.1177/0038038508094573

Conroy, K. M., Elliott, D., & Burrell, A. R. (2013). Developing content for a process-of-care checklist for use in intensive care units: a dual-method approach to establishing construct validity. *BMC Health Services Research*, *13,* 380-390. Retrieved from http://www.biomedcentral.com/1472-6963/13/380

Constable, T. F., Mabena, M. C., & Minishi-Mjanja, M. (2007). *South African government library services and the Batho Pele principles: How the eleven official languages impact on service delivery.* Paper presented at the World Library and Information Congress: 73rd International Federation of Library

Associations and Institutions Conference and Council, 19-23 August, Durban, South Africa. Retrieved from http://www.ifla.org/iv/ifla73/index.htm

Cox, H. S., McDermid, C., Azevedo, V., Muller, O., Coetzee, D., Simpson, J., ... Goemaere, E. (2010). Epidemic levels of drug resistant tuberculosis (MDR and XDR-TB) in a high prevalence HIV setting in Khayelitsha, South Africa. *PLoS ONE*, *5,* e13901. Retrieved from http://doi:10.1371/journal.pone.0013901

Cuellar, I., & Paniagua, F. (2000). *Handbook of multicultural mental health: Assessment and treatment.* San Diego, CA: Academic Press.

Dalton, D.S., Cruickshanks, K. J., Klein, B. E., Klein, R., Wiley, T. L., & Nondahl, D. M. (2003). The impact of hearing loss on quality of life in older adults. *The Gerontologist*, *43,* 661-668. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/14570962

Davies, P. D. (2003). The role of DOTS in tuberculosis treatment and control. *American Journal of Respiratory Medicine: Drugs, Devices and Other Interventions, 2* (3):203-209. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/14720002

De Andrade, V. & Ross, E. (2005). Beliefs and practices of black south african traditional healers regarding hearing impairment. *International Journal of Audiology, 44,* 489-499. doi:10.1080/14992020500188999

Denny, C. C., & Grady, C. (2007). Clinical research with economically disadvantaged populations. *Journal of Medical Ethics, 33,* 382–385. doi: 10.1136/jme.2006.017681

Department of Health. (2002). *Annual report 2002/2003: Western Cape Government*. Retrieved from http://www.westerncape.gov.za/sites/www.westerncape.gov.za/files/documents/2003/wc_health_ar.pdf

Department of Health. (2011). *National Strategic Plan on HIV, STIs and TB 2012 – 2016.* Retrieved from http://www.hst.org.za/publications/national-strategic-plan-hiv-stis-and-tb-2012-2016

Dinnes, J., Hewison, J., Altman, D. G., & Deeks, J. J. (2012). The basis for monitoring strategies in clinical guidelines: A case study of prostate-specific antigen for monitoring in prostate cancer. *Canadian Medical Association Journal, 184,* 169-177. doi:10.1503/cmaj.110600

Duggal, P., & Sarkar, M. (2007). Audiologic monitoring of multi-drug resistant tuberculosis patients on aminoglycoside treatment with long term follow-up. *BMC, Ear, Nose and Throat Disorders, 7*, 1-7. Retrieved from http://www.biomedcentral.com/1472-6815/7/5

Duijvestijn, J. A., Anteunis, L. J., Hoek, C. J., Van Den Brink, R. H., Chenault, M. N., & Manni, J. J. (2003). Help-seeking behaviour of hearing-impaired persons aged greater or equal to 55 years; effect of complaints, significant others and hearing aid image. *Acta Oto-laryngologica, 123,* 846–850. doi: 10.1080/0001648031000719

Durrant, J. D., Campbell, K., Fausti, S., Guthrie, O., Jacobson, G., Lonsbury-Martin, B. L., & Poling, G. (2009). *American academy of audiology position statement and clinical practice guidelines: Ototoxicity monitoring*. Retrieved from http://www.audiology.org

Dye, C., Harries, A. D., Maher, D., Hosseini, S. M., Nkhoma, W., & Salaniponi, F. M. (2006). Tuberculosis. In D. T. Jamison, R. G. Feachem, M. W. Makgoba, E. R. Bos, F. K. Baingana, K. J. Hofman, K. O. Rogo, (Eds.), *Disease and mortality in sub-saharan africa* (2nd ed.). Washington (DC): World Bank. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/21290646

Fallabi-Stubi, C., Zellweger, J. P., Sauty, A., Uldry, C., Lorillo, D., & Burnier, M. (1998). Electronic monitoring of adherence to treatment in preventative chemotherapy of tuberculosis. *International Journal of Tuberculosis and Lung Disease, 2,* 525-530. doi:10.1080/14622200310001608545

Fox, N., Hunn, A., & Mathers, G. (2009). *Sampling and sample size calculation*. Nottingham, UK: The NIHR RDS for the East Midlands / Yorkshire & the Humber.

Freitas, C., Tura, L. F. R., Costa, N., & Duarte, J. (2012). A population-based breast cancer screening programme: Conducting a comprehensive survey to explore adherence determinants. *European Journal of Cancer Care, 21,* 349-359. doi: 10.1111/j.1365-2354.2011.01305.x

Gandhi, N. R., Nunn, P., Dheda, K., Schaaf, H. S., Zignol, M., Soolingen, D., … Bayona, J. (2010). Multidrug-resistant and extensively drug-resistant tuberculosis: a threat to global control of tuberculosis. *The Lancet, 375,* 1830-1843. doi: 10.1016/S0140-6736(10)60410-2

Garcia-Prats, A. J., Donald, P. R., Hesseling, A. C., & Schaaf, H. S. (2013). *Second-line anti-tuberculosis drugs in children: A commissioned review for the World Health Organization 19th expert committee on the selection and use of essential medicines*. Retrieved from http://www.who.int/selection_medicines/committees/expert/19/applications/TB_624_C_R.pdf

Garstecki, D. C., & Erler, S. F. (1998). Hearing loss, control, and demographic factors influencing hearing aid use among older adults. *Journal of Speech, Language, and Hearing Research, 41,* 527-537. doi:10.1044/jslhr.4103.527

Georgoudisa, G. O., Oldhama, J. A., & Watson, P. J. (2001). Reliability and sensitivity measures of the Greek version of the short form of the McGill pain questionnaire. *European Journal of Pain*, *5,* 109-118. doi:10.1053/eujp.2001.0246

Gerritsen, A. M., & Devillé, W. L. (2009). Gender differences in health and health care utilisation in various ethnic groups in the Netherlands: a cross-sectional study. *BMC Public Health, 9,* 109. doi: 10.1186/1471-2458-9-109 http://www.biomedcentral.com/1471-2458/9/109

Ghurman, K. (2010). *Management: Concept, practice and cases.* New Delhi, India: Tata McGraw Hill Education Private Limited.

Govender, S., & Mash, R. (2009). What are the reasons for patients not adhering to their anti-TB treatment in a South African district hospital? *South African Family Practice, 51,* 512-516. Retrieved from http://www.ajol.info/index.php/safp/article/view/50083

Greenland, S. (2004). Model-based estimation of relative risks and other epidemiologic measures in studies of common outcomes and in case-control studies. *American Journal of Epidemiology, 160,* 301-305. doi: 10.1093/aje/kwh221

Grimes, D. A., & Schulz, K. F. (2002). Descriptive studies: what they can and cannot do. *The Lancet, 359,* 145–149. doi: http://dx.doi.org/10.1016/S0140-6736(02)07373-7

Gross, C. P., Mallory, R., Heiat, A., & Krumholz, H. (2002). Reporting the recruitment process in clinical trials: who are these patients and how did they get there? *Annals of Internal Medicine, 137,* 10 – 16. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12093240

Harkins, S. (2012). *Use COUNTIFS () to compare two data sets in Excel*. Retrieved from http://www.techrepublic.com/blog/microsoft-office/use-countifs-to-compare-two-data-sets-in-excel/

Harrell, F., Califf, R., Pryor, D., Lee, K., & Rosati, R. (1982). Evaluating the yield of medical tests. *Journal of the American Medical Association, 247,* 2543–2546. doi:10.1001/jama.247.18.2543.

Harris, T., Peer, S., & Fagan, J. J. (2012). Audiological monitoring for ototoxic tuberculosis, human immunodeficiency virus and cancer therapies in a developing world setting. *The Journal of Laryngology and Otology, 126,* 548-551. doi:10.1017/S00221511200357

Harris, T., Bardien, S., Schaaf, H. S., Petersen, L., De Jong, G., & Fagan, J. J. (2012). Aminoglycoside-induced hearing loss in HIV-positive and HIV-negative multidrug-resistant tuberculosis patients. *South African Medical Journal, 102,* 363-366. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/22668907

Healthcare. (2014). *Healthcare in South Africa.* Retrieved from http://www.southafrica.info/about/health/health.htm#.VKqUinvw2So

Helping our Women. (2015). *Helping our women: Cape cod volunteers*. Retrieved from http://www.helpingourwomen.org/more_home.html

Hess, J. E. (2009). Culturally sensitive health promotion plan for tuberculosis prevention and treatment in Mexican migrant farm worker populations. *Online Journal of Rural Nursing and Health Care, 9*, 95-102. Retrieved from http://rnojournal.binghamton.edu/index.php/RNO/article/view/90

Hogg, W., Gyorfi-Dyke, E., Johnston, S., Dahrouge, S., Liddy, C., Russell, G., & Kristjansson, E. (2010). Conducting chart audits in practice-based primary care research. *Canadian Family Physician, 56,* 495-496. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2868621/

Hopkins, W. G. (2008). Quantitative research design. *Sport Science, 12,* 12-21.Retrieved from http://sportsci.org/2008/wghdesign.htm

Houser, J. (2012). *Nursing Research: Reading, Using and Creating Evidence.* 2nd Edition. Sudbury, MA: Jones & Bartlett Learning, LLC.

Hsu, C. C., & Sandford, B. A. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation, 12,* 1-8. Retrieved from http://pareonline.net/pdf/v12n10.pdf

Huth, M. E., Ricci, A. J., & Cheng, A. G. (2011). Mechanisms of aminoglycoside ototoxicity and targets of hair cell protection. *International Journal of Otolaryngology, 2011,* 1-19. doi:10.1155/2011/937861

International Council of Nurses. (2008). *Promoting health advocacy guide for health professionals.* Retrieved from http://www.whpa.org/ppe_advocacy_guide.pdf

Integrated Regional Information Networks (2012). *Decentralizing care and treatment for drug-resistant TB.* Retrieved from http://www.irinnews.org/report/95643/south-africa-decentralizing-care-and-treatment-for-drug-resistant-tb

Jacobs, T. Q., & Ross, A. (2012). Adverse effects profile of multidrug-resistant tuberculosis treatment in a South African outpatient clinic. *South African Family Practice, 54*, 531-539. doi: 10.1080/20786204.2012.10874288

Jansen, A. C., van Aalst-Cohen, E. S., Hutten, B. A., Büller, H. R., Kastelein, J. J., & Prins, M. H. (2005). Guidelines were developed for data collection from medical records for use in retrospective analyses. *Journal of Clinical Epidemiology, 58,* 269-274. doi: http://dx.doi.org/10.1016/j.jclinepi.2004.07.006

Johanson, G. A., & Brooks, G. P. (2009). Initial scale development: Size for pilot studies. *Educational and Psychological Measurement*, *30,*1-7. doi:10.1177/0013164409355692

Kalaian, S. A., & Kasim, R. M. (2012). Terminating sequential delphi survey data collection. *Practical Assessment, Research & Evaluation, 17,* 1-10. Retrieved from http://pareonline.net/getvn.asp?v=17&n=5

Kaplan, R. M., & Saccuzzo, D. M. (2009). *Psychological testing: Principles, applications and issues.* Belmont, CA: Wadsworth Cengage Learning.

Khoza-Shangase, K., Mupawose, A., & Mlangeni, N. P. (2009). Ototoxic effects of tuberculosis treatments: How aware are patients? *African Journal of Pharmacy and Pharmacology, 3,* 391-399. Retrieved from http://www.academicjournals.org/ajpp

Khoza-Shangase, K. (2010). Is there a need for ototoxicity monitoring in patients with HIV/AIDS? *African Journal of Pharmacy and Pharmacology, 4,* 574-579. Retrieved from http://www.academicjournals.org/ajpp

Kimberlin C. L., & Winterstein, A. G. (2008). Validity and reliability of measurement instruments used in research. *American Society of Health-System Pharmacists, 65,* 2276-2284. doi: 10.2146/ajhp070364

Kruger, L. M., & Schoombee, C. (2010). The other side of caring: abuse in a South African maternity ward. *Journal of Reproductive and Infant Psychology, 28,* 84-101. doi: 10.1080/02646830903294979

Levy, A. R., Polman, R. C. J., & Clough, P. J. (2008). Adherence to sport injury rehabilitation programmes: An integrated psycho-social approach. *Scandinavian Journal of Medicine and Science in Sports, 18,* 798-809. doi:10.1111/j.1600-0838.2007.00704.x

Lindquist, K. (2014). *How can I estimate relative risk using GLM for common outcomes in cohort studies?* Retrieved from http://www.ats.ucla.edu/Stat/stata/faq/relative_risk.htm

Maldaner, C. R., Beuter, M., Brondani, C. M., Budo Mde, L., & Pauletto, M. R. (2008). Factors that influence treatment adherence in chronic disease patients undergoing hemodialysis. *Revista Gaúcha de Enfermagem, 4,* 647-653. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19320354

Margolis, R. H. & Saly, G. L. (2007). Toward a standard description of hearing loss. *International Journal of Audiology, 46, 746-758.* doi:10.1080/14992020701572652

Mash, B., Couper, I., & Hugo, J. (2006). Building consensus on clinical procedural skills for South African family medicine training using the Delphi technique. *South African Family Practice, 48,* 14. Retrieved from http://hdl.handle.net/10019.1/9284

Mayland, C. R., Williams, E. M., & Ellershaw, J. E. (2011). Assessing quality of care for the dying: The development and initial validation of a postal self-completion questionnaire for the bereaved relatives. *Palliative Medicine, 26,* 897 - 907. doi: 10.1177/0269216311424953

McLeod, S. (2013). *What is validity?* Retrieved from http://www.simplypsychology.org/validity.html

McNutt, L., Wu. C., Xue, X., & Hafner, J. P. (2003). Estimating the relative risk in cohort studies and clinical trials of common outcomes. *American Journal of Epidemiology, 157,* 940-943. doi: 10.1093/aje/kwg074

Médecins Sans Frontières. (2011). *Providing HIV/TB care at the primary health care level: Khayelitsha annual activity report 2008-2009*. Retrieved from http://www.health-e.org.za/documents/c110af046ff02d6d4d032755b5ca7e06.pdf

Meyer, C. & Hickson, L. (2012). What factors influence help-seeking for hearing impairment and hearing aid adoption in older adults? *International Journal of Audiology, 51,* 66-74. doi:10.3109/14992027.2011.611178

Mitchell, M., & Jolley, J. (2012). *Research design explained*. 8th edition. Belmont, CA: Wadsworth Cengage Learning.

Moore, S. (2012). Non-adherence in patients with breast cancer receiving oral therapies. *Clinical Journal of Oncology Nursing, 14,* 41-47. doi:10.1188/10.CJON.41-47

Mudd, P. A., Edmunds, A. L., Glatz, F. R., Campbell, K. C. M., & Rybak, L. P. (2012). *Ototoxicity*. Retrieved from http://emedicine.medscape.com/article/857679-overview#aw2aab6b3

Munro, S. A., Lewin, S. A., Smith, H. J., Engel, M. E., & Fretheim, A. (2007). Patient adherence to tuberculosis treatment: A systematic review of qualitative research. *PLoS Med, 4,* e238. Retrieved from http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0040238

Njuguna, C. W. (2013). Baseline prevalence and incidence and risk factors for new-onset drug induced hearing loss in adults receiving drug-resistant tuberculosis (DR-TB) treatment in Khayelitsha, South Africa. Unpublished Master's thesis, University of Cape Town, Cape Town, South Africa. Retrieved from http://hdl.handle.net/11427/10625

Nkosi, D., Janssen, S., Padanilam, X., Louw, R., Menezes, C. N., & Grobusch, M. P. (2013). Factors influencing specialist care referral of multidrug- and extensively drug-resistant tuberculosis patients in Gauteng/South Africa: A descriptive questionnaire-based study. *BMC Health Services Research*, *13,* 268. Retrieved from http://www.biomedcentral.com/1472-6963/13/268

Nteta, T. P., Mokgatle-Nthabu, M., & Oguntibeju, O. (2010). Utilisation of the primary health care services in the Tshwane region of Gauteng province, South Africa. *Africa Plos One*, *5,* 1-8. doi:10.1371/journal.pone.0013909

Olthof, D. C., van der Vlies, C. H., Joosse, P., van Delden, O. M., Jurkovich, G. J., & Goslings, J. C. (2013). Consensus strategies for the non-operative management of patients with blunt splenic injury: A Delphi study. *Journal of Trauma & Acute Care Surgery, 74,* 1567-1574. doi: 10.1097/TA.0b013e3182921627

Paasche-Orlow, M. K., Taylor, H. A., & Brancati, F. L. (2003). Readability standards for informed-consent forms as compared with actual readability. *The New England Journal of Medicine, 348,*721-726. doi: 10.1056/NEJMsa021212

Padarath, A., & Fonn, S. (2010). *South African health review*. Retrieved from http://www.hst.org.za/publications/south-african-health-review-2010

Ploughman, M., Austin, M., Stefanelli, M., & Godwin, M. (2010). Applying cognitive debriefing to pre-test patient reported outcomes in older people with multiple sclerosis. *Quality of Life Research, 19,* 483 - 487. doi:10.1007/s11136-010-9602-z

Polit, D. E., & Beck, C. T. (2008). *Nursing research, generating and assessing evidence for nursing practice.* 8th Edition. Philadelphia, PA: Wolters Kluwer Health.

Pooran, A., Pieterson, E., Davids, M., Theron, G., Dheda, K. (2013). What is the cost of diagnosis and management of drug resistant tuberculosis in South Africa? *PLoS ONE, 8,* e54587. Retrieved from www.ncbi.nlm.nih.gov/pubmed/23349933

Pope, T., & Sellers, T. (2012). The unbefriended: Making healthcare decisions for patients without surrogates (Part 2). *Journal of Clinical Ethics*, *23,* 177-192. Retrieved from http://philpapers.org/rec/POPLBT

Pretorius, E., de Klerk, G.W. & van Rensburg, H.C.J. (1993). *The traditional healer in South African health care.* Pretoria, SA: Human Sciences Research Council.

Raosoft. (2004). *Online sample calculator*. Retrieved from http://www.raosoft.com/samplesize.html

Rapoff, M. A. (2010). *Adherence to pediatric medical regimens* (2nd ed.). New York: Springer.

Reiter, A., Fischer, B., Kötting, J., Geraedts, M., Jäckel, W. H., Barlag, H., & Döbler, K. (2007). *Qualify: Instrument for the assessment of quality indicators.* Retrieved from http://bqs-institut.de/images/stories/doc/106_QUALIFY-english-v10.pdf

Ross, J. (2007). Health literacy and its influence on patient safety. *Journal of PeriAnesthesia Nursing, 22,* 220-222. doi: http://dx.doi.org/10.1016/

Sabati, N., Snyder, M., Edin-Stibbe, C., Lindgren, B., & Finkenstein, S. (2001). Facilitators and barriers to adherence with home monitoring using electronic spirometry. *American Association of Critical Care Nurse Clinical Issues, 12,* 178-185. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11759546

Salkind, N. (2010). *Encyclopaedia of research design* (Vol 3). Thousand Oaks, CA: Sage Publication, Inc.

Schacht, J. (2004). Mechanisms for aminoglycoside ototoxicity: Basic science research. In P. S. Roland (Ed), *Ototoxicity* (pp. 93-100). Ontario, Canada: BC Decker, Inc.

Schmidt von Wühlisch, F. & Pascoe, M. (2010). Maximising health literacy and client recall of clinical information: An exploratory study of clients and speech language pathologists. *South African Journal of Communication Disorders, 57,* 22-32. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/21329263

Scott, A. (2009). *Adults of 45 years and younger are not adherent to cholesterol-lowering medications*. Retrieved from http://drugtopics.modernmedicine.com/drug-topics/news/modernmedicine/modern-medicine-news/adults-45-years-and-younger-are-not-adherent-ch?page=full

Selimoglu, E. (2007). Aminoglycoside-induced ototoxicity. *Current Pharmaceutical Design*, *13,* 119-126. doi: 10.2174/138161207779313731

Shaikh, B. T., & Hatcher, J. (2004). Health seeking behaviour and health service utilization in Pakistan: challenging the policy makers. *Journal of Public Health, 27,* 49–54. doi:10.1093/pubmed/fdh207

Shapiro, G. K., & Shapiro, C. M. (2010). Factors that influence CPAP adherence: An overview. *Sleep and Breathing*, *14,* 323-335. doi: 10.1007/s11325-010-0391-y

Shelton, R. C., Jandorf, L., Ellison, J., Villagra, C & DuHamel, K. N. (2011). The influence of sociocultural factors on colonoscopy and FOBT screening adherence among low-income Hispanics. *Journal of Health Care for the Poor and Underserved*, *22,* 925-944. Retrieved from http://muse.jhu.edu/journals/journal_of_health_care_for_the_poor_and_underserved/v022/22.3.shelton.html

Sinanovic, E., Ramma, L., Vassall, A., Azevedo, V., Wilkinson, L., Ndjeka, N., … Cox, H. (2014). Impact of reduced hospitalisation on the cost of treatment for drug-resistant tuberculosis in South Africa. *The International Journal of Tuberculosis and Lung Disease, 19*, 172–178. doi: http://dx.doi.org/10.5588/ijtld.14.0421

Singh, A. S., Vik, F., Chinapaw, M., Uijtdewilligen, L., Verloigne, M., Fernández-Alvira, J. M., ... Brug, J. (2011). Test-retest reliability and construct validity of the ENERGY-child questionnaire on energy balance-related behaviours and their potential determinants: The ENERGY-project. *International Journal of Behavioural Nutrition and Physical Activity*, *8,* 136. doi: 10.1186/1479-5868-8-136

Smith, T. (1999). *Ethics in medical research.* Cambridge, UK: Cambridge University Press.

Tambs, K. (2004). Moderate effects of hearing loss on mental health and subjective well-being: results from the nord-Trondelag hearing loss study. *Psychomatic Medicine, 66,* 776-782. doi: 10.1097/01.psy.0000133328.03596.fb

TB Alliance. (2015). *Global alliance for TB drug development*. Retrieved from http://www.tballiance.org/why/mdr-xdr.php

Tejani, A., & Wasdell, M. (2010). *Data collection and entry/chart audit methodology.* Retrieved from http://research.fraserhealth.ca/media/2010%2002%2001%20Data%20Collection%20Chart%20Audit%20Methods.pdf

Terre Blanche, M. D., Durrrheim, K., & Painter, D. (Eds.) (2006). *Research in practice: Applied methods for the social sciences (2nd ed.).* Cape Town, South Africa: UCT Press.

Thabane, L. M., Ma, J., Chu, R., Cheng, J., Ismaila, A., Rios, L. P., ... Goldsmith, C. H. (2010). A tutorial on pilot studies: The what, why and how. *BMC Medical*

Research Methodology, *10,* 1-10. Retrieved from http://www.biomedcentral.com/1471-2288/10/1

Tredoux, C. & Durrheim, K. (2002). *Numbers, hypothesis & conclusions: A course in statistics for the social sciences.* Cape Town, South Africa: UCT Press.

Trochim, W. (2006). *Research methods knowledge base*. Retrieved from http://www.socialresearchmethods.net/kb/quescont.php

Tumbo, M. I., & Ogunbanjo, G. A. (2011). Evaluation of directly observed treatment for tuberculosis in the Bojanala health district, North West Province of South Africa. *African Journal of Primary Health Care and Family Medicine, 3*, 191-194. doi:10.4102/phcfm.v3i1.191

Twycross, A., & Shields, L. (2004). Validity and reliability - What's it all about? *Paediatric Nursing, 16,* 28. Retrieved from https://www.rcn.org.uk/__data/assets/pdf_file/0012/9210/Validity_1.pdf

Ushie, B. A. & Jegede, A. S. (2012). The paradox of family support: Concerns of tuberculosis- infected HIV patients about involving family and friends in their treatment. *AIDS Patient Care and STDs, 26,* 674-680. doi:10.1089/apc.2011.0304

Vaidya, V. P., Partha, G., Pharm, B., & Kamakar, M. (2012). Gender differences in utilization of preventative care services in the United States. *Journal of Women's Health*, *21,* 140-145. doi:10.1089/jwh.2011.2876

Valete-Rosalino, C. M., & Rozenfeld, S. (2005). Auditory screening in the elderly: comparison between self-report and audiometry. *Revista Brasileira de Otorrinolaringologia, 71,* 193-200. doi: http://dx.doi.org/10.1590/S0034-72992005000200013

Van der Walt, H. (2004). Too close for comfort: Emotional ties between nurses and patients. In: L. Swartz, K. Gibson, T. Gelman (Eds.). *Reflective practice: Psychodynamic ideas in the community* (pp. 73–84). Cape Town, SA: HSRC Press.

Van Ryneveld, P., Parnell, S., & Muller, D. (2003). *Indigent policy: Including the poor in the city of Cape Town's income strategy.* Retrieved from http://www.capetown.gov.za/en/Policies/Documents/indigentpolicy2.pdf

Vivian, L. M. H., Naidu, C. S., Keikelame, M. J., & Irlam, J. (2011). Medical students' experiences of professional lapses and patient rights abuses in a South African health sciences faculty. *Academic Medicine, 86,* 1282–1287. doi: 10.1097/ACM.0b013e31822be4b8

Weiss, T. (2013). *Sensorineural hearing loss and ototoxic medications*. Retrieved from http://www.disabled-world.com/disability/types/hearing/snhl.php

Western Cape Government. (2011). *The future of health care in the Western Cape.* Retrieved from http://www.westerncape.gov.za/other/2011/12/healthcare_2020_-_9_december_2020.pdf

Western Cape Government. (2014). *TB control programme.* Retrieved from http://www.westerncape.gov.za/service/tb-control-programme

Wild, D., Grove, A., Martin, M., Eremenco, S., McElroy, S., Verjee-Lorenz, A., & Erikson, P. (2005). Principles of Good Practice for the Translation and Cultural Adaptation Process for Patient-Reported Outcomes (PRO) Measures: Report of the ISPOR Task Force for Translation and Cultural Adaptation. *Value in Health, 8,* 94-104. doi: http://dx.doi.org/10.1111/j.1524-4733.2005.04054.x

World Health Assembly. (1991). Forty-Fourth World Health Assembly, Geneva, 6–16 May 1991. *Resolutions and decisions*. Geneva, Switzerland: World Health Organization 1991. WHA44/1991/REC/1. Retrieved from https://scholar.google.com.br/scholar?q=%20Resolution%20WHA%2044.8

World Health Organization. (2000). *TB report-Stop TB partnership*. Retrieved from http://stoptb.org/assets/documents/events/meetings/amsterdam_conference/TB2000Report.pdf

World Health Organization. (2001). *International classification of functioning, disability and health*. Retrieved from http://www.who.int/classifications/icf/en/

World Health Organization. (2010). *Treatment of tuberculosis guideline (4th ed.)*. Retrieved from http://whqlibdoc.who.int/publications/2010/9789241547833_eng.pdf

World Health Organization. (2013). *Global tuberculosis report*. Retrieved from http://www.who.int/tb/publications/global_report/en/

World Health Organization. (2014). *Global tuberculosis report*. Retrieved from http://www.who.int/tb/publications/global_report/en/

World Medical Association Declaration of Helsinki. (2008). *Ethical principles for medical research involving human subjects.* Retrieved from http://www.wma.net/en/30publications/10policies/b3/index.html

Zegers, M., de Bruijne, M. C., Wagner, C., Groenewegen, P. P., Waaijman, R., & van der Wal, G. (2007). Design of a retrospective patient record study on the occurrence of adverse events among patients in Dutch hospitals. *BMC Health Services Research, 7,* 27. doi: 10.1186/1472-6963-7-27

Zou, G. (2004). A modified poisson regression approach to prospective studies with binary data. *American Journal of Epidemiology,* 159, 702-706. Retrieved from http://aje.oxfordjournals.org/content/159/7/702.long

Appendix A: Data Collection Sheet

Date of Review _____ Age_____

Sex _____ Place of referral/residence_____

Researcher _____

Inclusion Criteria

TB patient exposed to aminoglycosides on TB DOTS programme between _____ (*month, year*) and _____(*month, year*).

Y___ N___

If No, this file is ineligible for this audit

---

1. Treatment regimen

   _____

2. Initial hearing status

   _____

   _____

3. Comment on patient hearing test adherence (attendance out of the first six appointments)

_____
_____
_____

Attendance	Date when treatment started (dd-mm-yyyy)	Date of 1st Audiology appointment 1 (dd-mm-yy)	Apt 2 (e.g. Y/N)	Apt3	Apt 4	Apt 5	Apt 6
MDR-TB							

Appendix B: Ethics Approval Letter 1

HREC Ref 604/2012 – 27Nov2012

UNIVERSITY OF CAPE TOWN

Faculty of Health Sciences
Human Research Ethics Committee
Room E52-24 Groote Schuur Hospital Old Main Building
Observatory 7925
Telephone [021] 406 6338 • **Facsimile** [021] 406 6411
e-mail: shuretta.thomas@uct.ac.za

27 November 2012

HREC REF: 604/2012

Ms P Nhokwara
c/o Ms C Rogers
Health & Rehab
Communication Science & Disorders
F-Floor
OMB

Dear Ms Nhokwara

PROJECT TITLE: FACTORS THAT INFLUENCE THE UTILISATION OF OTOTOXICITY MONITORING PROGRAMME

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year till the 15th December 2013

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/research/humanethics/forms)

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the HREC. REF in all your correspondence.

Yours sincerely

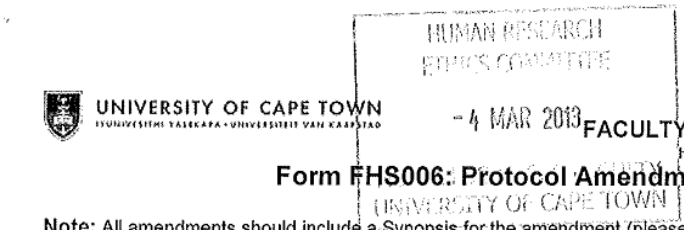
pp TUBurgess

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN ETHICS
Federal Wide Assurance Number: FWA00001637.

Institutional Review Board (IRB) number: IRB00001938
This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical

s.thomas

Appendix C: Ethics Approval-Additional Sites



UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

FACULTY OF HEALTH SCIENCES
Human Research Ethics Committee

Form FHS006: Protocol Amendment

Note: All amendments should include a Synopsis for the amendment (please see notice dated 23 April 2012)

HREC office use only (FWA00001637; IRB00001938)		
☐ Approved	☑ Type of review: Expedited	☐ Full committee
This serves as notification that all changes and documentation described below are approved.		
Signature Chairperson of the HREC		Date 4/3/2013

Principal Investigator to complete the following:

1. Protocol information

Date	27 February 2013		
HREC REF Number	604/2012		
Protocol title	Factors that influence the utilisation of ototoxicity monitoring programme		
Protocol number (if applicable)			
Principal Investigator	PRIMROSE T. NHOKWARA		
Department / Office Internal Mail Address	Health + Rehabilitation, CSD primrose.nhkprico1@myuct.ac.za		
1.1 Does this protocol receive US Federal funding?		☐ Yes	☑ No
1.2 Is this a major or a minor amendment (see FHS006hlp)?		☐ Major	☑ Minor

2. List of Proposed Amendments with Revised Version Numbers and Dates

Please itemise on the page below, all amendments with revised version numbers and dates, which need approval. This page will be detached, signed and returned to the PI as notification of approval. Please add extra pages if necessary.

1. Additional sites for data collection - Revised version 1; 03 March 2013
   Aim 1: Adding Vanguard CHC
   Aim 2: Adding Site C Khayelitsha CHC

Appendix D: Provincial Approval

Western Cape Government
Health

STRATEGY & HEALTH SUPPORT
[illegible]
tel: +27 21 483 9907 fax: +27 21 483 9852
4th Floor Helen Bowden House 8 Wale Street Cape Town 8001
www.capegateway.gov.za

REFERENCE: RP 168/2012
ENQUIRIES: Ms Charlene Roderick

UCT Obz Square Residence
129 Main road
Observatory
7925

For attention: Primrose Nhokwara

Re: Factors that influence the utilisation of ototoxicity monitoring programme

Thank you for submitting your proposal to undertake the above-mentioned study. We are pleased to inform you that the department has granted you approval for your research.
Please contact the following **Mr Tuta, 021 361 4835** to assist you with any further enquiries for the following facilities:

Ubuntu Site B
Kahyelitsha CHC
Kindly ensure that the following are adhered to:

1. Arrangements can be made with managers, providing that normal activities at requested facilities are not interrupted.
2. Researchers, in accessing provincial health facilities, are expressing consent to provide the department with an electronic copy of the final report within six months of completion of research. This can be submitted to the provincial Research Co-ordinator (healthres@pgwc.gov.za).
3. The reference number above should be quoted in all future correspondence.

Yours sincerely

DR NT Naledi
DIRECTOR: HEALTH IMPACT ASSESSMENT
DATE: 6/2/2013
CC **MR D HEYNS** **ACTING DIRECTOR: EASTERN / KHAYLEITSHA**

STRATEGY & HEALTH SUPPORT
healthres@pgwc.gov.za
tel: +27 21 483 9907: fax: +27 21 483 9895
1st Floor, Norton Rose House,, 8 Riebeek Street, Cape Town, 8001
www.capegateway.gov.za

REFERENCE: RP 168/2012
ENQUIRIES: Ms Charlene Roderick

UCT Obz Square Residence
129 Main road
Observatory
7925

For attention: Primrose Nhokwara

Re: Factors that influence the utilisation of ototoxicity monitoring programme

Thank you for submitting your proposal to undertake the above-mentioned study. We are pleased to inform you that the department has granted you approval for your research.
Please contact the following people to assist you with any further enquiries in accessing the following sites:

Vanguard CHC	**Mr L Mbanga**	**Contact No. 021 694 5540**
Nolungile Site C	**Mrs Mqikela**	**Contact No. 021 387 1107**
Brooklyn Chest Hospital	**Dr P Spiller**	**Contact No. 021 614 8103**

Kindly ensure that the following are adhered to:

1. Arrangements can be made with managers, providing that normal activities at requested facilities are not interrupted.
2. Researchers, in accessing provincial health facilities, are expressing consent to provide the department with an electronic copy of the final report within six months of completion of research. This can be submitted to the provincial Research Co-ordinator (healthres@pgwc.gov.za).
3. The reference number above should be quoted in all future correspondence.

Yours sincerely

DR NT Naledi
DIRECTOR: HEALTH IMPACT ASSESSMENT
DATE: 26/6/2013

CC **DR A HAWKRIDGE** **DIRECTOR: EASTERN / KHAYLEITSHA**
CC **DR K GRAMMER** **DIRECTOR: SOUTHERN / WESTERN**

Appendix E: Research Information Letter for Pilot and Final Questionnaire Administration

School of Health and Rehabilitation Sciences
Faculty of Health Sciences
Divisions of Communications Sciences and Disorders, Nursing and Midwifery, Occupational Therapy & Physiotherapy
F45 Old Main Building,
Groote Schuur Hospital,
Observatory 7925
Tel: +27 (0)21 406 6315
Fax: +27(0) 86 611 0725
Email: Christine.Rogers@uct.ac.za
Lebogang.Ramma@uct.ac.za
Internet: www.uct.ac.za

Title of the Study: Factors that influence the utilisation of ototoxicity monitoring programme

Supervisor: Christine Rogers

Co-Supervisor: Dr Lebogang Ramma

MSc Student: Primrose Nhokwara

Institution: University of Cape Town

Introduction

My name is Primrose Nhokwara. I am studying at the University of Cape Town. My supervisors are Christine Rogers and Dr Lebogang Ramma. For my study I want to find out what makes people come or not come for the hearing tests performed at the Khayelitsha (Site B and Site C) community health clinic (CHC) and Brooklyn Chest Hospital. I would like to invite you to be part of this study. If you say yes, you need to read and understand what the study is about. This letter will tell you what will happen. Please make sure you fully understand what is involved before you say yes.

Ethical approval: *This clinical study protocol has been submitted to the University of Cape Town, Human Research Ethics Committee (HREC) and written ethical approval has been granted by that committee (HREC 604/2012).*

Purpose of the study:

This clinic is able to test hearing when people are getting treated for TB. We are trying to find out the reasons that make people come or not come for these tests. Since you come to this clinic, we think you might be able to tell us more about this as you are using this clinic for your TB treatment. We want your opinion as a patient. This will help us to improve the current services provided. It will also help us when putting more of these services in other communities like this one.

Study Procedures:

The following will be expected of you when you decide to take part in the study:

- You will be asked to go through a questionnaire and let us know of your opinions regarding your knowledge and experience of the hearing tests at the clinic.
- The questions will be read to you and it will take about 5 minutes to answer the questionnaire.
- If, however you are not able to proceed with the study for whatever reason, you are free to withdraw from the study. Your treatment at the clinic will not be affected in any way.

Benefits:

Airtime voucher will be given as a token of appreciation for taking part in our research project. Your participation will help us to improve delivering our services to you. The findings from this study will be presented to the Department of Health and the research participants via the notice board at the community clinic.

Risks:

There are no risks associated in taking part in this study. The information that you will provide through the discussion and feedback on the questionnaire will help the community by how changes can be made to deliver the hearing tests services currently being given.

Costs:

There are no costs involved. The study will be done on the days you are already scheduled to come for treatment to the clinic.

Confidentiality:

Your privacy will be maintained during the study and when writing up the findings. The information provided on the questionnaire will be stored away in a locked cabinet where only my supervisors and I will have access to. Any identifying information will be removed when storing the feedback from the questionnaires on an Excel spread sheet on a password protected computer.

Voluntary Participation:

Taking part in this study is voluntary. If at any point you want to drop out from the study, you have the right to do so without your treatment being affected in any way. There will be no penalties for dropping out of the study.

Questions:

All questions related to this study can be forwarded to the following individuals:

Primrose Nhokwara (Researcher)

Cell: 073 827 6771 Email: nhkpri001@myuct.ac.za

Christine Rogers (Supervisor)

Tel: 021 406 6315 Email: christine.rogers@uct.ac.za

Dr. Lebogang Ramma (Co-Supervisor)

Tel: 021 406 6954 Cell: 073 153 3803 Email: Lebogang.Ramma@uct.ac.za

A/Prof. Mark Blockman (Chairperson)

University of Cape Town, Faculty of Health Sciences, Human Research Ethics Committee Email: Mark.Blockman@uct.ac.za

Appendix F: Informed Consent Letter

School of Health and Rehabilitation Sciences
Faculty of Health Sciences
Divisions of Communications Sciences and Disorders, Nursing and Midwifery, Occupational Therapy & Physiotherapy
F45 Old Main Building,
Groote Schuur Hospital,
Observatory 7925
Tel: +27 (0)21 406 6315
Fax: +27(0)86 611 0725
Email: Christine.Rogers@uct.ac.za
Lebogang.Ramma@uct.ac.za
Internet: www.uct.ac.za

Institution: University of Cape Town

Title of the Study: Factors that influence the utilisation of ototoxicity monitoring programme

MSc Student: Primrose Nhokwara

I _____ have read (or had read to me by _____) the Information Sheet. I understand what is required of me and I have had all my questions answered. I do not feel that I am forced to take part in this study and I am doing so of my own free will. I know that I can withdraw at any time if I so wish and that it will have no bad consequences for me.

Signed:

_____ _____

Participant Date and place

_____ _____

Researcher Date and place

Appendix G: Draft Questionnaire

Topic: Factors that influence the utilisation of ototoxicity monitoring programme

Instructions:

The following questions describe your experience at the clinic as a TB patient. Please select the appropriate response based on your experience. Please answer every question. If you are not sure, please choose the one that best matches your experience.

		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
1	The taxi costs to the clinic stop me from attending my clinic appointments				
2	**It takes long to travel to the clinic from home/work**				
3	I am unable to take time off work every month in order to get my hearing tested				
4	I did not attend my clinic appointments because the TB pills make me very sick				
5	**I know about the hearing tests done for people with TB**				
6	**I have had my hearing tested when I started taking TB pills**				
7	People wait for long in the queue to get their hearing tested that is why I do not come				
8	**My hearing is fine so I do not need to have it checked**				
9	**I do not hear as well as I used to**				
10	**The nurses have explained why I need to have my hearing tested**				
11	The nurses at the clinic are helpful and friendly				
12	The nurses are concerned about me as a TB patient and give the care I need				
13	**The nurses shout at me if I forget to take my TB pills**				
14	Testing my hearing is not as important as taking my TB pills				
15	**You cannot avoid losing your hearing so I just have to accept it**				
16	**I am aware that TB pills can cause hearing loss**				
17	Hearing loss is a sign of punishment from the ancestors				
18	I have a hearing loss because I was bewitched				
19	My family supports me in this time of illness				
20	**My family reminds me to attend my clinic appointment**				

Appendix H: Final English Questionnaire

Topic: Factors that influence the utilisation of ototoxicity monitoring programme

Instructions:

The questions below ask about your experience at the clinic as a TB patient. Please select the response with a cross **(X)** based on your experience.

1. Have you ever missed your hearing test appointment?

Yes		No	

2. Did you or would you miss your hearing test appointment because of any of the following reasons?:

a). Taxi costs to the clinic?

Strongly Agree		Agree		Disagree		Strongly Disagree	

b). Unable to take time off work?

Strongly Agree		Agree		Disagree		Strongly Disagree	

c). TB medication making you very sick?

Strongly Agree		Agree		Disagree		Strongly Disagree	

d). Long waiting queues?

Strongly Agree		Agree		Disagree		Strongly Disagree	

e). Any other reasons?

_____

_____

_____

_____

_____

_____

		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
3.	Do you think you only need to have your hearing tested if you feel deaf?				
4.	Do you think testing your hearing is as important as taking your TB medication?				
5.	Do you find the nurses rude that is why you do not come?				
6.	Do you think the nurses at the clinic are helpful and friendly				
7.	Do you think it is God's will if you get a hearing loss?				
8.	Do you think hearing loss is a sign of punishment from the ancestors?				
9.	Do you think you have a hearing loss because you were bewitched?				
10.	Do you think the hearing loss will go away when you finish your TB treatment?				

Appendix I: Delphi Research Information Letter

School of Health and Rehabilitation Sciences
Faculty of Health Sciences
Divisions of Communications Sciences and Disorders, Nursing and Midwifery, Occupational Therapy & Physiotherapy
F45 Old Main Building,
Groote Schuur Hospital,
Observatory 7925
Tel: +27(0)21 406 6315
Fax: +27(0)86 611 0725
Email: Christine.Rogers@uct.ac.za
Lebogang.Ramma@uct.ac.za
Internet: www.uct.ac.za

Title of the Study: Factors that influence the utilisation of ototoxicity monitoring programme

Supervisor: Christine Rogers

Co-Supervisor: Dr Lebogang Ramma

MSc Student: Primrose Nhokwara

Institution: University of Cape Town

Introduction

My name is Primrose Nhokwara. I am studying at the University of Cape Town. My supervisors are Christine Rogers and Dr Lebogang Ramma. For my study I want to find out what makes people come or not come for the hearing tests done at the Khayelitsha (Site B and C) community health clinic (CHC). I would like to invite you to be part of this study. If you say yes, you need to read and understand what the study is about. This letter will tell you what will happen. Please make sure you fully understand what is involved before you say yes.

Ethical Approval: *This clinical study protocol has been submitted to the University of Cape Town, Human Research Ethics Committee (HREC) and written ethical approval has been granted by that committee (HREC 604/2012).*

Purpose of the Study:

This clinic is able to test hearing when people are getting treated for TB. We are trying to find out the reasons that make people come or not come for these tests. Since you are knowledgeable in the area of TB or have experience working with TB patients, we think you might be able to give us more insight as a health professional. Your opinion as a health professional will help us to ask he right questions thereby improve the current services provided. It will also help us when putting more of these services in other communities like this one.

Study Procedure:

You will be asked go through the questionnaire and write down what you think of the questions. There will be space after each question for you to write your comments regarding your suggestions about the question. You will check if there are any changes that need to be made to it and if the language used is acceptable. It will take about 10 – 15 minutes to go through the questionnaire.

Benefits:

There is unfortunately no immediate benefit for you, nor payment for having taken part in our research project. However, your participation will help us to improve delivering our services to you. The findings from this study will be presented to the Department of Health and the research participants via the notice board at the community clinic. The findings can also be emailed it to you as per your request.

Risks:

There are no risks associated in taking part in this study. The information that you will provide through the discussion and feedback on the questionnaire will help the community by how changes can be made to deliver the hearing tests services currently being given.

Costs:

There are no costs expected. The feedback with your suggestions will be sent via email or physically collecting the hard copy from you.

Confidentiality:

Your privacy will be maintained during the study and when writing up the results. Any identifying information will be removed when storing the feedback from the questionnaires on an Excel spread sheet on a password protected computer.

Voluntary Participation

Taking part in this study is at will. If at any point you do not want to continue with the study, you have the right to do so and there will be no penalties for dropping out of the study.

Questions:

All questions related to this study can be forwarded to the following individuals:

Primrose Nhokwara (Researcher)

Cell: 073 827 6771 Email: nhkpri001@myuct.ac.za

Christine Rogers (Supervisor)

Tel: 021 406 6315 Email: christine.rogers@uct.ac.za

Dr. Lebogang Ramma (Co-Supervisor)

Tel: 021 406 6954 Cell: 073 153 3803 Email: Lebogang.Ramma@uct.ac.za

A/Prof. Mark Blockman (Chairperson)

University of Cape Town, Faculty of Health Sciences, Human Research Ethics Committee Email: Mark.Blockman@uct.ac.za

Appendix J: Flesch-Kincaid Analysis

Reading Ease

A higher score indicates easier readability; scores usually range between 0 and 100.

Readability Formula	**Score**
Flesch-Kincaid Reading Ease	87.3

Grade Levels

A grade level (based on the USA education system) is equivalent to the number of years of education a person has had. Scores over 22 should generally be taken to mean graduate level text.

Readability Formula	**Grade**
Flesch-Kincaid Grade Level	2.7
Gunning-Fog Score	5
Coleman-Liau Index	6.7
SMOG Index	4.1
Automated Readability Index	0
Average Grade Level	**3.7**

Text Statistics

Character Count	793
Syllable Count	276
Word Count	207
Sentence Count	31
Characters per Word	3.8
Syllables per Word	1.3
Words per Sentence	6.7

Appendix K: Translated (Xhosa) Questionnaire

Igama lesifundo: Izizathu ezenza abantu basebenzise konke okwe ototoxicity monitoring programme

Landela oku:

Lemibibuzo ilandelayo ikubuza ngolwazinge Kliniki njengomntu one TB. Sicela uphendule ngokubala u "X" kovumelana nayo.

2. Wakhe waliphosa idinga lako lokuvavanya iindlebe?

Ewe		Hayi	

2. Ingaba izizathu ezenze uphose idinga lako zikhona kwezi zilandelayo?

a). Imali yokukhwela uze eKliniki?

Ndivuma kakulu		Ndiyavuma		Andivumi		Andivumi kakulu	

b). Ukungakwazi ukuthetha ixesha emsebenzini?

Ndivuma kakulu		Ndiyavuma		Andivumi		Andivumi kakulu	

c). Amayeza e-TB ayakugulisa?

Ndivuma kakulu		Ndiyavuma		Andivumi		Andivumi kakulu	

d). Ixesha elide ulindile emgceni?

Ndivuma kakulu		Ndiyavuma		Andivumi		Andivumi kakulu	

e). Sikhona esinye isizathu?

_____

_____

_____

		Ndiyavuma kakulu	**Ndiyavuma**	**Andivumi**	**Andivumi kakulu**
3.	Ingaba ucinga kufuneka uyovavanya iindlebe zakho xa uziva zivaleka?				
4.	Ingaba ucinga ukuvavanya iindlebe zako kubaluleke njengokuthatha amayeza wako e-TB?				
5.	Ingaba isizathu esenza ungezi ngoo-mongikazi abangenabubele?				
6.	Ingaba ucinga ukuba oo-mongikazi banobubele ngokuncedisana nawe?				
7.	Ingaba ucinga ukuba kukwenza komdali ukuba uye waveleka iindlebe?				
8.	Ingaba ucinga ukuba abaphantsi bayakuvalela xa kuvaleka iindlebe zakho?				
9.	Ingaba ucinga ukuba uthakathiwe xa iindlebe zako zivalekile?				
10.	Ingaba ucinga ukuba zizokuvuleka iindlebe zakho xa uyigqibile uwathatha amayeza eTB?				

Appendix L: City of Cape Town Approval

Civic Centre
12 Hertzog Boulevard
Cape Town 8001
P O Box 299, Cape Town 8000
Ask for: Dr G H Visser
Tel: 021 4003981
Cell: 0832988718
Fax: 021 4214894
E-mail: Helenvi.visser@capetown.gov.za
Website: http://www.capetown.gov.za
Ref:
Filename: G:\Research\2013\Phokwara 10358.docx

Izikhi eCurrie
12 Hertzog Boulevard
Cape Town 8001
P O Box 299, Cape Town 8000
Cella: Qth G H Visser
Umnxeba: 021 4003981
Cell: 0832988718
Ifaksi: 021 4214894

Burgersentrum
Hertzog boulevard 12
Kaapstad 8001
Posbus 299, Kaapstad 8000
Vra vir: Dr G H Visser
Tel: 021 4003981
Sel: 0832988718
Faks: 021 4214894

CITY HEALTH – Specialised Health

2013-08-20

re: Research Request: Factors that influence the utilisation of ototoxicity monitoring programme (ID NO: 10358)

Dear Ms Nhokwara

Permission has been granted to do your research at Nolungile Clinic as requested subject to you discussing your research project with the Sub District Manager Dr V de Azevedo as well as presenting your project proposal to the relevant staff.

Contact People

Khayelitsha Sub District: Nolungile Clinic
Dr V de Azevedo (Sub District Manager)
Tel: (021) 360-1258/ 083 629 3344
Mrs S Patel Abrahams (Head: PHC & Programmes)
Tel: (021) 360-1153/ 084 405 6065

Please note the following:

1. All individual patient information obtained must be kept confidential.
2. Access to the clinic and its patients must be arranged with the relevant Manager such that normal activities are not disrupted.
3. A copy of the final report must be sent to the City Health Head Office, P O Box 2815 Cape Town 8001, within 6 months of its completion and feedback must also be given to the clinics involved.
4. Your project has been given an ID Number (10358). Please use this in any future correspondence with us.

Thank you for your co-operation and please contact me if you require any further information or assistance.

Yours sincerely

DR G H VISSER
MANAGER: SPECIALISED HEALTH

cc. Dr de Azevedo & Mrs Patel Abrahams